Prevalence of Periodontal Diseases among the Adult Tribal Population in Nilgiris - An Epidemiological Study

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CERTIFICATE

This is to certify that this dissertation titled **"Prevalence of Periodontal Diseases among the Adult Tribal Population in Nilgiris – An epidemiological study"** is a bonafide record of work done by **Dr. Biju Philip** under our guidance and to our satisfaction during his postgraduate study period of 2009-2012.

The Dissertation is submitted to The Tamil Nadu Dr. MGR Medical University in partial fulfillment for the award of the degree of Master of Dental Surgery – Periodontics, Branch II. It has not been submitted (partial or full) for the award of any other degree or diploma.

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CONTENTS

LIST OF TABLES

LIST OF GRAPHS

Oral health is an important aspect of overall health status of an individual. Teeth and their supporting periodontal structures are of critical importance to oral health. Periodontitis is one of the most widespread diseases of mankind[37]. As periodontal disease is one of the primary causes of tooth loss and is also associated with health problems such as Cardiovascular Diseases, Cerebrovascular Accidents, Diabetes Mellitus and Pregnancy Associated Complications, the estimation of its prevalence in the population and the identification of high risk groups are of great importance[22].

Periodontal disease is considered to result from an imbalance between potentially pathogenic microbes and the nature of the host responses. Periodontitis is known to vary according to race, gender and socioeconomic status, suggesting that factors related to social environments may also be important in disease development[34].

Based on the above, epidemiological research in periodontology must fulfill the task of providing data on the prevalence and severity of periodontal disease in the particular population. It should also elucidate aspects related to the etiology and determinants of development of the disease.

Periodontal health is in great measure dependent on personal oral hygiene and periodic professional care, improvement in these areas can be expected to lead to reductions in the prevalence, severity and extent of the periodontal diseases[10].

Despite remarkable world-wide progress in the field of diagnostic, curative and preventive medicine, still there are large populations of people living in natural and unpolluted surroundings far away from civilization, maintaining their traditional values, customs, beliefs and myths.

The tribes of Nilgiris are people who are segregated from this modern civilization. The accessibility of these tribes to medical and dental care is minimal. Though they form a very small percentage of the total population, it is essential to extend our knowledge and facilities in order to improve their health status.

Literature on the periodontal status of tribes of Nilgiris is almost negligible. Hence this study is designed to provide information on the periodontal status of the tribes of Nilgiris and serve as a baseline data for further study and comparison.

India has one of the largest tribal concentrations in the world. They are mainly concentrated in the vast central Indian belt from Rajasthan and Gujarat in the west to Andhra Pradesh, Orissa and Bengal, and the entire north-eastern region. In peninsular India, Andhra Pradesh stands out as a major hub of tribals. Tamil Nadu and Kerala have each a very small percentage of tribals, but both these states as well as Karnataka have several dozens of distinct tribal communities dispersed over large areas. There are a few concentrated pockets in these states and the Nilgiri biosphere is one of them. In the Nilgiris, it is Wayanad district and its contiguous Gudalur block that have a higher than average concentration of tribals. According to the 2001 census, the scheduled tribe population of Tamil Nadu is 1.04%, while in the Nilgiris district, it is 4.32% of the total general population[13].

The Nilgiris is a unique biosphere in the Western Ghats characterized at the higher altitudes by savanna (grasslands) and shola (Evergreen Mountain) forests in the ravines, moist and dry deciduous forests and thorn and scrub in the middle and lower ranges, and evergreen and semi-evergreen forests to the west. Three-fourths of the lower ranges still comprises of forest. The biosphere, thus encompasses a very diverse variety of climatic and geographic micro regions at heights ranging from 400 m to over 2500 mabove mean sea level. It is located where the Eastern and Western Ghats meet. Theaverage height of the Gudalur and Wayanad parts of the plateau is 900 m. In the Mudumalai sanctuary and Nilambur, the forests are of the moist deciduous type. Huge and tall valuable trees like rosewood, teak and myrobalan grow. It also has abundant bamboo trees. The evergreen forests are found in the Silent Valley region of Kerala and in the Wayanad-Gudalur region. The Burliar-Coimbatore plains are covered with dry deciduous forests[5].

The Nilgiris are the home of a large variety of flora and fauna, some of them endemic to the region. New species continue to be discovered. But it has also become a biodiversity hotspot where some species have already become extinct and others are under threat of extinction. Some animal species of the Nilgiris like the tiger, the tahr, and the lion tailed macaque and the Nilgirilangur have become endangered species and many plant species have become rarer due to environmental degradation in the past couple of centuries. Since ancient times, the hills are also home to a number of tribal (Adivasi) groups, prominent among them being the Paniyans, Kattunayakans, Mullakurumbas, Bettakurumbas and Irulas. They are concentrated mainly at the Gudalur block of Nilgiris district which comprises of Gudalur and Pandalurtaluks. Pandalur is the taluk with the highest concentration of tribals[5].

After 1947, the most consequential thing that happened to the Nilgiris was the bifurcation of a homogenous biosphere into three states and three linguistic regions. With the states reorganization in 1956, this biosphere was split into three states– TamilNadu, Karnataka and Kerala. Kodagu went to Karnataka, Wayanad went to Kerala, and what is now called the Nilgiris went to Tamil Nadu. With this bifurcation of a unique biosphere and meeting point of many different ethnic groups, the identity of the Nilgiris was artificially reduced to what is now known as the Nilgiri district of Tamil Nadu. This district forms roughly 40% of the total Nilgiri biosphere. Horticulture and tea plantations continue to be the mainstay of the economy in Nilgiri district[5].

The histories of the various tribes in Nilgiris are as follows:

The Kurumbas: They are the pre-dravidian ancient inhabitants of the Nilgiris. Kurumba is not the name of a single tribe. Rather it indicates a common name applied todifferent ethnic communities in and around the Nilgiris area in Tamil Nadu, Karnataka andKerala. In the Mysore plains, they are considered as shepherds. Their nameprobably originates from their early occupation of tending sheep (kuru) as a pastoralpeople. According to legends, the Kurumbas in the Nilgiri hills are the modernrepresentatives of the ancient Kurumbas or Pallavas who were once very powerful throughout southern India. Their power was at its zenith in the 7th century, but the Kongu, Chola and Chalukya chiefs succeeded in winning several victories over them. They were finally overthrown by the Chola dynasty of Tanjore in about the 9th century and got scattered far and wide. Many fled to the hills and presently their descendantsare found in the Nilgiris, Wayanad, Kodagu and Mysore[5].

Five different groups of Kurumbas have been identified. Each of them being a distinct ethnic group differing from the others in language, religion, traditional occupations and other cultural features. They also inhabit different parts of the Nilgiris. The Alu or Palukurumbas live in the higher ranges, the Bettakurumbas(also called Kadukurumbas) and Jenukurumbas (also called Kattunayakans) in thelower heavily forested areas, and the Mullu and Uralikurumbas in the lower ranges and foothills. Only the Bettakurumbas, Kattunayakans and Mullakurumbas live in the Nilgiri district[5].

The Kattunayakans: Kattunayakansare tribal group found in all the four southern states. The name denotes that they are the nayakans (chiefs) of the kadu/kattu (forest). In the Nilgiris, they are found only in Pandalur and Gudalurtaluks and live in 43 settlements located inside or near the forests. The Kattunayakans of the Nilgiri district of Tamil Nadu speak Kannada and Malayalam with Telugu and Tamil words. Their traditional occupations are hunting and honey gathering, fishing, bird trapping and shifting agriculture[5].

The Paniyans: Paniyans live in the states of Kerala, Tamil Nadu and Karnataka. Within the Nilgiri district, they live only in the Gudalur and Pandalurtaluks. There are 47Paniyan settlements in Pandalurtaluk and about 19 in Gudalur. They are the mostancient inhabitants of Wayanad and are expert hunters, agriculturists, dancers andmusicians. They were brought over from the Malabar in Kerala to the Nilgiris by the Manthadan Chettis as agricultural labourers. Often they were caught physically by members of land owning communities, provided shelter and held as bonded labourers. The term Paniyan originates from the Malayalam word *pani*meaning work; Pannikkarmeans worker or labourer. The term Paniyan is used to address males, whereas the females are referred to as Panichi. In physical appearance they resemble African tribes .At one time, they were the principal stock-in-trade for the slave trade on the west coast and it is possible that they were imported from Africa and sold in Malabar. They speak 'Paniyabhasha,' which is a dialect of Malayalam with some Tamil and Tulu words and they are able to converse in Malayalam and Tamil[5].

They were bought and sold as slaves until the "Abolition of Slavery Act" of the British government in the nineteenth century and worked as labourers on the farmlands owned by rich landlords. A number of them continue to work as bonded labour for landlords, although officially bonded labour has been abolished by the Indian government and many were rehabilitated on government owned farms. The Paniya habitat is near thick forest where wild animals roam; or cultivated land where crops like paddy, millets, plantains and spices like pepper, ginger, tapioca etc. are grown; and also marshy low-lying lands where paddy is grown. Most of the Paniyans are employed as agricultural labourers. A small percentage of them work in tea estates and tea factories[5].

Each of these communities tries to maintain its distinct ethnic identity and therefore, maintains a social distance from the others. In the past, the ethnic groups, while maintaining their social distance from one another and preserving their cultural, life-style and occupational differences, respected each other's territory and there was no conflict of interest. In fact, there was an exchange of goods and services. Even today, Paniyans and Mullakurumbas have economic or monetary transactions between them besides the ritual exchange of gifts, but Mullakurumbas consider themselves to be more superior and advanced community as compared to the others. All the communities are afraid of the Kattunayakans because of their practice of black magic and sorcery. At the same time, in the early period, all three communities took the help of the Kattunayakan's herbal medicine and magical powers to cure the diseases of men, women, children and domestic animals[5].

Literacy level is one of the key indicators of the socio-economic conditions of a society and of the social groups within it. There is a considerable gap in the literacy level of these tribes compared with that of the general literacy level in the State[5.] At present Viswabharathy Vidhyodaya Trust, a charitable trust in Gudalur is trying to increase the awareness about education in the adivasi villages, enrolling children in the government schools and ensuring their attendance and teaching them in the 1st and 2nd standards.

The health situation of the tribals was pathetic. There was an urgent need to prevent unnecessary deaths and provide health care. So, ASHWINI (Association for Health Welfare in Nilgiris) launched the community health programme in the villages – training tribal women on preventive health care, immunising and monitoring the pregnant women and children, and improving. This health awareness in the community intensive programme immediately resulted in a dramatic improvement in the health status of the tribal community.ASHWINI is a charitable organization providing comprehensive health care for the tribals. Started as a small community health programme, ASHWINI grew into an organization comprising of a 20 bedded hospital, 8 sub-centers and as an important institution owned and managed by the people themselves

Stan and Mari started ACCORD (Action for community organization, rehabilitation and development), as an activist group in response to the rampant land alienation of the tribals in the Gudalur Valley and to help the tribals organise themselves in order to assert their human rights - especially their land rights.

Fig. 1, View of Nilgiris

Fig. 2,Adivasi Hospital, Gudalur

Fig. 3, Tribal habitats in Nilgiris

Fig. 4, Awareness program by health assistants from ASHWINI

The aim of the study is to determine,

I. Prevalence of periodontal disease,

II. The oral hygiene status,

III. The relationship of the prevalence of periodontal disease with the oral hygiene, oral hygiene methods practiced, habits and nature of the diet.

IV. The dental health knowledge of the tribal population in Nilgiris.

Russel AL 1959[32] described some epidemiological characteristics of periodontal disease which had appeared consistently in a series of 31 studies. Both the prevalence and severity of the disease increase with age. Negroes showed a higher prevalence and a greater severity of disease than whites at all ages. Disease is slightly more prevalent in males than in females.

Sigurd P. Ramfjord et al 1968[31] reviewed six surveys on periodontal diseases in five countries such as Ceylon, India, Iran, Nigeria and Sudan. The purpose of these epidemiological studies was to assay the status of periodontal health in various parts of the world. At the same time, a number of alleged etiological factors were recorded and studied for possible associations with patterns of prevalence and severity of periodontal disease. They summarized the review as almost 100% prevalence of periodontal disease in developing countries. An overwhelmingly strong association between amount of debris and or calculus and severity of periodontal disease had been reported. No consistent relationship between periodontal status and sex, race, ethnic and nutritional status when persons of equal age and oral hygiene status were compared.

Loe et al 1986[24] in a cohort study, conducted among the 480 male tea plantation workers in Srilanka, between the age group of 14-31 years when initially recruited in 1970, who are not exposed to any preventive or therapeutic intervention related to oral diseases. The final examination conducted in 1985 concluded that despite of the poor plaque control, three distinct patterns of progression of periodontitis were observed over the follow-up period, based on interproximal attachment loss and tooth mortality rates. 8% cases showed rapidly progressing periodontal disease, 11% of cases showed no progression of periodontal disease, 81% of cases showed moderate progression.

This study clearly demonstrates the huge variability in the progression of periodontitis in a homogeneous population and suggested that variables other than age, plaque and gingival inflammatory status are important determinants of periodontal deterioration over time.

Baelum et al 1986[3] conducted a study among the adult Tanzanians, aged 30-69 years reported despite the subjects exhibiting large amounts of plaque and calculus, periodontal pocket deeper than 3 mm and attachment loss of > 6 mm occurred at less than 10% of the tooth surfaces. Only a very small percentage of subjects had experienced major tooth loss. This data suggested that advanced periodontal disease was not evenly distributed in the population and not readily correlated to supragingival plaque levels.

Baelum et al 1988[4] conducted a similar study in Kenya in 1131 subjects aged 15-65 years and confirmed their earlier observations.

Hoover J 1989[16] evaluated the periodontal status of a population of 117 adult Hutterites living in Saskatchewan, Canada, was assessed. Despite poor oral hygiene levels and inadequate dental knowledge, the presence of periodontitis was low.

Anil S et al 1990[1] evaluated the periodontal condition of a selected population in Trivandrum, Kerala, India comprised of 2756 subjects (1354 males and 1402 females) between the age group 15-44 yrs using CPITN as clinical parameter. They reported 33% of the population between 35-44yrs had deep periodontal pockets > 6 mm.

Joseph PA and Cherry RT 1996[1] assessed the periodontal treatment needs in 3692 patients attending dental college hospital between the age group of 15-64 yrs using CPITN. They reported that the disease severity increased with increasing age. Females were having better periodontal condition. Low income people were having poor periodontal status. Persons using brush and paste were having better periodontal status.

Papapanou PN 1996[28] reported that the interpretation of epidemiological data of periodontal disease is difficult, due to inconsistencies in the methodology used. It is not possible, therefore, to accurately assess if the prevalence of the periodontal diseases shows a world-wide decline. As long as the disease is assessed through accumulated clinical attachment loss, retention of the natural dentition in older ages entails increased prevalence in these cohorts. Contemporary epidemiological studies should ideally employ full-mouth examination of the periodontal tissues. Partial recording estimates are generally biased, especially when the prevalence of the disease is low. Aggressive periodontitis is infrequent in all populations. Chronic periodontitis is rather prevalent; however, advanced disease affects limited sub fractions of the population (probably less than 10 to 15%). Although prevalence figures vary with race and geographic region, in most cases, the progression pattern of the disease seems compatible with the retention of a functional dentition throughout life. Behavioral and environmental risk markers identified by multi-variate analysis, smoking and presence of certain subgingival microorganisms have been proven to be true risk factors. The same holds true for diabetes mellitus. In certain cases, periodontal infections appear to have a systemic impact on the host. Most recent data indicate that periodontal disease may confer risk for coronary heart disease and pre-term low birth weight.

Haffajee AD 2001[14]examined clinical features of periodontal disease and patterns of attachment loss in adult periodontitis subjects who were current, past or non smokers. The results showed that current smokers had significantly more attachment loss, missing teeth, deeper pockets and fewer sites exhibiting bleeding on probing as compared to past or non smokers.

Hobdell MH 2001[15] reported that the prevalence of periodontitis is not uniformly distributed among various races, ethnicities or socioeconomic groups. He reviewed the origins of economic globalization and examined the available evidences concerning its possible impact on oral health. The specific oral diseases included in the study were dental caries, periodontal disease, cancrum oris and oral cancer. He concluded that there is a growing disparity between rich and poor populations and increasing levels of the above oral diseases might be attributed as a part of this economic phenomenon.

Mine Tezal et al 2001[39] assessed the relationship between alcohol consumption and severity of periodontal disease by a cross-sectional study of 1371 subjects, aged 25-74 yrs. Alcohol intake was assessed by means of previously validated self-reported questionnaires. Subjects consuming > 5 drinks / week had higher gingival bleeding and more severe clinical attachment loss compared to those who consumed < 5 drinks / week. Subjects consuming >10 drinks / week had higher gingival bleeding and more severe clinical attachment loss compared to those consuming <10 drinks / week. They suggested that alcohol consumption is associated with moderately increased severity of periodontal disease. Longitudinal studies are needed to determine whether alcohol is a true risk factor for periodontal disease.

Varunee Kerdvongbundit 2002[17] evaluated the prevalence and severity of periodontal destruction as influenced by smoking in a Thai population. The smokers exhibited more frequent and severe mandibular molar periodontal destruction than non smokers. The prevalence and severity of gingival recession, periodontal pocket formation, clinical attachment loss, furcation involvement and tooth mobility were significantly increased in smokers compared to non-smokers. 73% of the smokers exhibited furcation involvement in contrast to 20 % of the non-smokers. The results of this study suggest that smoking appears to be a major environmental factor associated with accelerated periodontal destruction in adult smokers with generally high oral hygiene standards and regular dental care habits.

Anwar Merchant 2002[25] conducted a study to assess the relation between periodontitis and oral hygiene practices among United States health professionals which comprised of 533 subjects (14.3% male dentists, 13.7% male non-dentist health care professionals and 71.5% female nurses). The results showed that 70% of the dentists and nurses brushed twice a day compared to 56% of the other health professionals. Two thirds of the nurses, 56.3% dentists and 36.4% other health professionals flossed at least once daily. Persons brushing twice daily were as likely to have periodontitis as those brushing once or less daily. Persons flossing less than once a day were as likely to have periodontitis as those who flossed daily. They concluded that oral hygiene practices were not associated with periodontitis in this population.

Amarasena N 2003[2] studied association between smoking, betel chewing and gingival bleeding in rural population in Sri Lanka consisting of 2179 males between the age of 20-60 years. The levels of plaque and gingivitis were recorded on four sites of all teeth present excluding third molars, using the Plaque Index (PlI) and Gingival Index (GI). Information pertaining to socio demographic variables, oral hygiene practices and tobacco consumption habits was obtained from all subjects. Logistic regression analysis revealed that the association between betel chewing and gingival bleeding was positive (OR= 2.41; $p< 0.0001$) whereas that of smoking and gingival bleeding was negative (OR=0.75; $p< 0.05$). Oral hygiene had the strongest relationship with gingival bleeding (OR= 18.11).

Krustrup U et al 2006[19] conducted a study on 1,115 Danish adults aged 35-44 years and 65-74 years to assess the periodontal health status in the Danish adult population and to analyze how the level of periodontal health is associated with age, gender, urbanization, socio-economic factors, and frequency of visiting dental office; furthermore, to compare the periodontal health status of Danish adults with that of adults in other industrialized countries.. Data were collected by means of personal interviews and by clinical examinations in accordance with the World Health Organization Basic Methods Criteria. The clinical examination revealed a low prevalence of healthy periodontal conditions in both age groups: at age 35-44 years, 7.7% and at age 65-74 years, 2.4% had healthy periodontal conditions.

Tomar SL, 2007[40] reported that periodontal diseases have long been recognized as risk factors for increased tooth mobility and tooth loss. The established adverse effects of periodontal diseases have led to the inclusion of a specific United States national objective, "reduce destructive periodontal disease in adults aged 35to 44 years.

Miyuki Kibayashi 2007[18] conducted a study to examine the prospective association between smoking and periodontal disease progression and the effects of smoking on salivary biomarkers related to periodontitis. Probing depth (PD) was measured at health check-ups of workers in 1999 and 2003; lifestyle information was obtained through a questionnaire. In 2003,219 of 256 (86%) workers examined at baseline completed PD measurements; saliva samples were also collected. Change in PD was used for assessment of periodontitis progression when three or more sites displayed an increase of 2 mm over 4 years. Salivary biomarker levels were determined by real-time polymerase chain reaction and enzyme assay. They concluded the study that smoking exerted the greatest influence on periodontitis risk among lifestyle factors. Smoking may suppress the host defense system, which may aggravate periodontal disease progression.

Lai et al 2007[22] conducted a study to estimate the prevalence and severity of periodontal disease in the Taiwanese population aged 35-44 years, using Community Periodontal Index and attachment loss to measure periodontal status and a questionnaire to collect demographic information. They reported that the prevalence of periodontal disease in 35-44 year olds was found to be high. Poorer periodontal health was observed in males, less educated and manual workers.

Girish Parmar 2008[29] conducted a study on 365 subjects (168 chewers and 197 non-chewers with mean age of 32.5years) to clarify the effects of chewing a quid containing areca nut and tobacco on periodontal tissue and oral hygiene status. Clinical data on periodontal tissues, oral hygiene status and bleeding from the gums were recorded. The effect of quid chewing on periodontium, i.e. occurrence of periodontal pockets, gingival lesions and gum recession were significantly higher in quid chewers than in non-chewers. The present data indicate that chewing quid comprising areca nut and tobacco has adverse effects on periodontal tissues and oral hygiene.

Cristine da Silva et al 2008[36] conducted a study to evaluate the relationship between alcohol dependence and periodontal disease. A cross-sectional study of 49 alcoholic and 49 non-alcoholic men was conducted at Philippe Pinel Institute. Socio demographic data and periodontal clinical parameters, such as visible plaque, bleeding on probing, probing depth (PD) and clinical attachment level (CAL), were collected. The independent effect of alcohol dependence on CAL and PD was assessed by multiple linear regression analysis, adjusting for the effects of plaque, age, income, education, and living conditions. Results showed that a significant linear relationship was found between alcohol dependence and mean CAL and mean PD.

Kumar S 2008[20] assessed the prevalence and pattern of periodontal disease among green marble mine labourers and to use the data to provide a baseline for planning and evaluation of oral health care. This study comprised 513 male subjects in four age groups (18 to 25, 26 to 34, 35 to 44 and > 45 years) collected using the stratified cluster sampling method.

The data were collected by World Health Organization (WHO) oral health assessment form and clinical examination was conducted by the methods recommended by the WHO oral health surveys. The prevalence of periodontal disease was found to be 98.2%. Bleeding on probing and calculus were widespread. The mean number of healthy sextants decreased abruptly with an increase in age. The greatest periodontal destruction was manifested in the 35 to 44 year old age group.

Sripriya Nagarajan 2008[26] conducted a cross-sectional study to assess the extent of agreement between clinical and self assessed periodontal health status among patients visiting out patient department of M.S.Ramaiah dental college, Bangalore, India. The study population included 216 patients aged between 20 and 44 years. The study population was subjected to a self administered questionnaire (questions regarding bleeding gums, deposits on teeth, receding gums, swelling of gums, loose teeth), which was followed by periodontal examination using the criteria of Loe and Silness Gingival Index, Community Periodontal Index and mobility respectively. The study showed that the perceived periodontal health was low and the discrepancy between the subjectively and objectively assessed needs was very distinct. The awareness of the periodontal problems has been reported to increase with increasing severity of the disease.

Sumanth S 2008[38] evaluated and compared the periodontal effects of paan chewing with or without the use of tobacco as an ingredient. The periodontal status of 300 subjects (150 subjects were paan chewers with tobacco and 150 subjects were paan chewers without tobacco) was evaluated using the Community Periodontal Index (CPI). The subjects were selected by the stratified random sampling method. The oral hygiene status of the subjects was evaluated using the simplified oral hygiene index.

Probing depth of 6 mm or more, was seen in 30% of paan chewers with tobacco compared with 7.3% of paan chewers without tobacco. It was found that paan chewers with tobacco had 4.7 times more risk of having pockets than paan chewers without tobacco. The higher codes of Loss of Attachment were seen in paan chewers with tobacco compared with paan chewers without tobacco. It was found that paan chewers with tobacco had 7 times more risk of having Loss of Attachment when compared with the paan chewers without tobacco.

T. Santhosh Kumar 2009[21] assessed the oral health status of the Bhil tribal population of southern Rajasthan and to investigate the association of age, oral hygiene and dental visiting practices with oral health status. A cross-sectional study of Bhil tribal adults chosen by a multi stage stratified random sampling procedure. The total sample size was 1,590 male tribal dentate subjects aged 15-54 years. Clinical recordings of oral hygiene status (OHI – S), caries status (DMFT and DMFS) and treatment needs, and periodontal status (CPI) were done. The results showed that the study population was characterized by a lack of previous dental care, high treatment needs, high prevalence of periodontal disease and poor oral hygiene.

Stefan Baumgartner et al 2009[7] conducted a study to assess the oral microbiota and clinical data in subjects without access to traditional oral hygiene methods and who ate a diet available in the Stone Age. Ten subjects living in an environment replicating the Stone Age for 4 weeks were enrolled in this study. Bleeding on probing (BOP), Gingival and Plaque Indices, and Probing Depth (PD) were assessed at baseline and at 4 weeks.

Microbiologic samples were collected at the mesio-buccal subgingival aspects of all teeth and from the dorsum of the tongue and were processed by checkerboard DNA-DNA hybridization methods. Results showed that mean BOP decreased from 34.8% to 12.6%. Mean Gingival Index scores changed from 0.38 to 0.43 and mean plaque scores increased from 0.68 to 1.47. PD at sites of subgingival sampling decreased. At week 4, the total bacterial count was higher for 24 of 74 species, including Bacteroides ureolyticus, Eikenella corrodens, Lactobacillus acidophilus, Capnocytophaga ochracea, Escherichia coli, Fusobacterium nucleatum naviforme, Haemophilus influenzae, Helicobacter pylori, Porphyromonas endodontalis, Staphylococcus aureus (two strains), Streptococcus agalactiae, Streptococcus anginosis, and Streptococcus mitis. Bacterial counts from tongue samples were higher at baseline for 20 species, including Tannerella forsythia, Aggregatibacter actinomycetemcomitans and Streptococcus spp. They concluded that experimental gingivitis protocol is not applicable if the diet (e.g., Stone Age) does not include refined sugars. Although plaque levels increased, the bleeding on probing and probing depth decreased. Subgingival bacterial counts increased for several species not linked to periodontitis, whereas tongue bacterial samples decreased during the study period.

Beck JD, Arbes SJ 2009[8] reported that epidemiology is the study of the distribution and determinants of health related states or events in specified populations and the application of this study to control health problems. So the purpose of epidemiology is to apply the knowledge gained from studies to promote, protect and restore health.

The practice of evidence based dentistry requires clinical practitioners to use the best available scientific information in making decisions. Much of these scientific informations come from epidemiologic studies.

Paul I. Eke 2009[12] conducted a study to assess the use of self-report oral health measures for predicting the population prevalence of periodontitis in United States adults. Data were collected from 456 subjects participating in a 2007 study conducted by the Centers for Disease Control and Prevention. Each subject answered eight predetermined oral health self-report questions obtained from in person interviews and were given a full-mouth periodontal examination using the National Health and Nutrition Examination Survey protocol. The results showed that multivariable modeling of specific self-report oral health measures on gum disease; loose teeth and tooth appearance were most promising for predicting the population prevalence of severe periodontitis, confirming earlier assessments from a national survey. These results justify further assessments of self-report oral health measures for use in the surveillance of periodontitis in the adult United States population.

Yong H. Chu 2010[11] investigated the periodontal health status of male Smokeless Tobacco (ST) users from a rural population. Adult male residents of two rural Appalachian Ohio counties and daily ST users, with a unilateral mandibular oral ST keratosis lesion, were recruited. Subjects completed a questionnaire and received oral examination. Teeth present, ST keratosis lesion, Plaque and Gingival Index, Probing Depth (PD), Recession Depth (RD), and Attachment Level were recorded.

Recession prevalence is much greater in ST-site quadrants (36%) compared to NST-site quadrants (Contralateral sites where smokeless tobacco is not placed) (18%; P <0.001). Twice as many teeth had recession on ST-site than NST-site. Average buccal RD on ST site teeth did not differ from that on the NST-site teeth. Although average buccal attachment loss is greater on ST-site teeth, when stratified by years of ST use, subjects using ST for 10 to 18 years exhibit the most differences between ST and NST sites, whereas subjects using ST for <10 years show no differences. The results indicate that greater gingival recession prevalence and extent are associated with ST placement site in rural male ST users.

Agarwal V.et al 2010[1] conducted a systematic review on the prevalence of periodontal diseases in India, concluded that periodontal diseases are one of the more prevalent oral diseases affecting more than 50% of indian community. Untreated chronic periodontitis is responsible for tooth loss in majority of the cases. Constant presence of chronic inflammation and inflammatory mediators has also been proved to be a significant risk factor of several systemic diseases e.g. preterm low birth weight babies, coronary artery diseases, diabetes mellitus etc.

The present study was conducted among the adult (35-44 years of age) tribal population of Nilgiris which comprises of Paniyas, Mullakurumbas, Bettakurumbas, Irulasand Kattunayakans. The available population in this age group was examined in their habitat. Information regarding the population and other details of the tribals were collected from ASHWINI (Association for Health Welfare in Nilgiris). The total population in these tribal groups is 16,000 according to the registration in the AMS. Among this, the adult (35-44) population was 2301. So sample sizes of 303 persons were selected.

As per our request, Dr.Shylaja Devi Menon, Medical Superintendent, GudalurAdivasi Hospital granted permission to conduct this screening programme.

A total of 303 people were examined. Among this, 134 people from the Paniya tribe, 21 from the Mullakurumba tribe, 80 from the Bettakurumba tribe, 3 from the Irula tribe,and 65 from the Kattunayakan tribe were examined. Before the starting of the survey, a pilot study was conducted where 50 people were screened in their habitat.

Examination was done in natural day light, using mouth mirror and CPI probe in their habitats. These instruments were autoclaved and pouched in a sterile disposable sealed bag.The data was recorded in a printed WHO oral health assessment form. Community Periodontal Index (CPI) and Loss of Attachment were used to record the periodontal status[42]. Plaque Index (Silness J and Loe H, 1964) was used to record the oral hygiene status[35]. Personal interview was conducted to collect data regarding awareness, oral hygiene measures, diet and habits like smoking, paan chewing, smokeless tobacco and alcohol.

All the relevant informations were collected and recorded. These data were subjected to statistical evaluation.

Fig. 5,
Conducting the personal interview

Fig. 6,
Conducting the personal interview

Fig. 7,
Oral Examination

Fig. 8,
Oral Examination

ORAL HEALTH ASSESSMENT FORM

Country: .....

Leave blank (1) (4) | Year Month (5) (8) | Day (9) (10) | Identification number (11) (14) | Examiner (15) | Original/duplicate (16)

GENERAL INFORMATION

Name ----------

Date of Birth (17) Year Month (20)

Age in years (21) (22)

Sex (M = 1, F = 2) (23)

Ethnic group (24)

Occupation (25)

Geographical location (26) (27)

Location type: (28)
1 = Urban
2 = Periurban
3 = Rural

OTHER DATA (Specify and provide codes)

---------- (29)

---------- (30)

CONTRAINDICATION TO EXAMINATION

Reason: ---------- (31)

---------- 0 = No
1 = yes

ORAL HABITS

	SMOKING	PAN CHEWING	SMOKELESS TOBACCO CHEWING	ALCOHOL	OTHERS
FREQUENCY / NO. / DAY					
DURATION IN MONTHS/YEARS					
TYPE					
BRAND					

Have you suffered from any tooth disease / problems? **Yes** **No**

Are you aware that brushing teeth are good for oral health? **Yes** **No**

Type of food you eat?

1. Vegetarian		**Non-Vegetarian**	
2. Cooked		**Un-cooked**	
3. Processed		**Non-processed**	
4. Sugar content		**Non-sugar content**	
5. Fibrous		**Non-fibrous**	

ORAL HYGIENE MEASURES

	BRUSH	FINGER	ANY OTHER
CLEANING			
FREQUENCY			
DENTIFRICES			

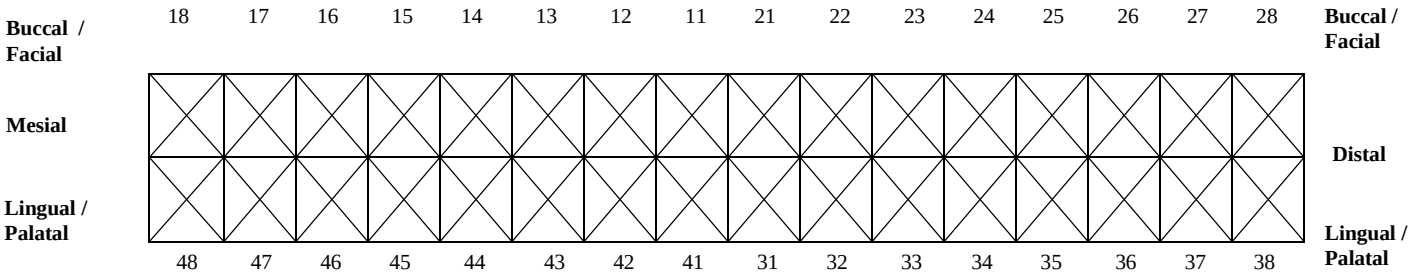
TEETH PRESENT

	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8

Missing ☒

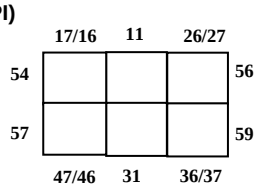
`

PLAQUE INDEX (PLI) - SILNESS P. AND LOE H.



Score:
0 = No plaque
1 = A film of plaque
2 = Moderate plaque
3 = Abundant plaque

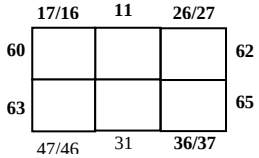
COMMUNITY PERIODONTAL INDEX (CPI)



0 = Healthy
1 = Bleeding
2 = Calculus
3* = Pocket 4-5 mm (black band on probe partially visible)
4* = Pocket 6 mm or more (black band on probe not visible)
X = Excluded sextant
9 = Not recorded

*Not recorded under 15 years of age

LOSS OF ATTACHMENT*



0 = 0-3 mm
1 = 4-5 mm (cementoenamel junction (CEJ) within black band)
2 = 6-8 mm (CEJ between upper limit of black band and 8.5 mm ring)
3 = 9-11 mm (CEJ between 8.5 mm and 11.5 mm rings)
4 = 12 mm or more (CEJ beyond 11.5 mm ring)
X = Excluded sextant
9 = Not recorded

*Not recorded under 15 years of age

NEED FOR IMMEDIATE CARE AND REFERRAL

Life-threatening condition ☐ (177)
Pain or infection ☐ (178)
Other condition (Specify): ☐ (170)

0 = Absent
1 = Present
9 = Not recorded

Referral ☐ (180)
0 = No
1 = Yes
9 = Not recorded

Notes

Statistical tools used in this study:

The chi-square test provides a method for testing the association between the row and column variables in a two-way table. The null hypothesis H0 assumes that there is no association between the variables (in other words, one variable does not vary according to the other variable), while the alternative hypothesis Ha claims that some association does exist. The alternative hypothesis does not specify the type of association, so close attention to the data is required to interpret the information provided by the test. The chi-square test is based on a test statistic that measures the divergence of the observed data from the values that would be expected under the null hypothesis of no association. This requires calculation of the expected values based on the data. The expected value for each cell in a two-way table is equal to (row total column total) / n, where n is the total number of observations included in the table.

In statistics, t-test is used for comparing two groups by mean values. In non-parametric tests, the Mann–Whitney U test (also called the Mann–Whitney–Wilcoxon (MWW) or Wilcoxon rank-sum test) is used for assessing whether one of two samples of independent observations tends to have large values. It is one of the most well-known non-parametric significance tests. It is used to compare the two groups based on ranks of numeric scores.

The correlation is one of the most common and most useful statistics. A correlation is a single number that describes the degree of relationship between two variables. Pearson correlation (hereafter called correlation), assumes that the two variables are measured on at least interval scales and it determines the extent to which values of the two variables are "proportional" to each other.

In general, the purpose of analysis of variance (ANOVA) is to test for significant differences between means. Elementary concepts provide a brief introduction to the basics of statistical significance testing. If we are only comparing two means, ANOVA will produce the same results as the t-test for independent samples (if we are comparing two different groups of cases or observations) or the t-test for dependent samples (if we are comparing two variables in one set of cases or observations).

The present study was undertaken to assess the prevalence of periodontal disease among the adult tribal population and its relationship with the oral hygiene, oral hygiene methods practiced, habits and nature of the diet. A study population of 303 people from different tribes was examined from the age group of 35-44 years in both sexes.

(Table 1 and 2) (Graph 1 and 2) shows the total number of population screened in each ethnic group and the average age of the population. In Paniya group, 32.1% (43) were males and 67.9% (91) were females. In Mullakurumba group, 52.4% (11) were males and 47.6% (10) were females. In Bettakurumba group 46.3% (37) were males and 53.8% (43) were females. In Kattunayakans, 52.3% (34) were males and 47.7% (31) were females.In Irula group, 33.3% (1) were males and 66.7% (2) were females. Highest numbers of males were present in Mullakurumba ethnic group and highest number of females was in Paniya group. The mean age is 39.8 years for males and 38.9 years for females.

(Table 3, Graph 3) shows prevalence of periodontal diseases based on CPI. 75.2% of the total population had presence of calculus; 15.8% had periodontal pocket 4-5 mm; 6.3% had periodontal pocket ≥ 6; 2% of the population had healthy periodontium.

(Table 4) (Graph 4) shows prevalence of periodontal diseases based on Loss of Attachment. 18.5% of the total population had Loss of Attachment of 4-5mm; 22.1% had Loss of Attachment of 6-8mm; 23.8% with Loss of Attachment of 9-11mm; 8.9% with the Loss of Attachment ≥ 12mm and 26.4% of the population had healthy periodontium.

(Table 5) (Graph 5) shows Loss of Attachment with the gender group. 33.3% of the male population had an attachment loss of 9-11mm, whereas 38.4% of the total female population had healthy periodontium. Only 16.9% of the female population had Loss of Attachment of 9-11mm.

Table 6 (Graph 6) shows relationship of the gender with CPI. 69% males and 79.7% females of the total population had abundant presence of calculus. i.e. CPI score of 2.

The tables (7A and 7B) (Graph 7) shows that whenever Plaque Index was poor, CPI score was higher. According to Chi-square test, this association was found to be statistically significant at 5% level.

The tables (8A and 8B) (Graph 8) show that when Plaque Index was poor, there is 51.5% (17) of people with Loss of Attachment 9-11mm and 27.3% (9) with Loss of Attachment $\geq$ 12mm. According to Chi-Square test, this association is statistically significant.

The tables (9A and 9B) (Graph 9) shows that when CPI scores were compared with oral hygiene measures, we found statistically significant differences between those using brush and finger. 79.7% (157) of the population who used finger as their oral hygiene measure had abundant presence of calculus, whereas only 67.6% (71) had presence of calculus for those who used brush as oral hygiene measure.

The tables (10A and 10B) (Graph 10) shows that when oral hygiene measures were compared with Loss of Attachment, 27.4% (54) of population who used finger had an attachment loss of 9-11mm and 11.7% (23) had an attachment loss of ≥12 mm, which is highly significant.

The tables (11A and 11B) (Graph 11) show that 67.2% (133) population who used finger as an oral hygiene measure had fair Plaque Index and 13.6% (27) had poor Plaque Index. This association is found to be significant.

The tables (12A and 12B) (Graph 12) shows that when the dentifrice used is compared with CPI score, no significant differences in the CPI score were recorded between tooth paste, tooth powder and charcoal.

The tables (13A and 13B) (Graph13) shows that maximum Loss of Attachment (≥12) is among the people who used charcoal. This relation is found to be not statistically significant.

When Plaque Index is compared with dentifrices used, Plaque Index was fair among the highest percentage of people irrespective of whether they use tooth paste, tooth powder or charcoal. This association is statistically significant. (Tables 14A and 14B) (Graph14).

No statistically significant association was found in the CPI scores of vegetarians and non- vegetarians (15A and 15B) (Graph 15).

No statistically significant association was found in the Loss of Attachment scores of vegetarians and non – vegetarians (16A and 16B) (Graph 16).

Association between Plaque Index and smoking is highly significant and smokers had more Plaque Index score than non- smokers. Association between smoking and CPI is found to be highly significant and smokers had a higher CPI score than the non-smokers. Association between smoking and Loss of Attachment was also found to be highly significant and Loss of Attachment in smokers were more than that in non-smokers. (Tables 17A and 17B) (Graph17).

Paan chewers had more Plaque Index scores than non-paan chewers which were found to be statistically significant. Paan chewers had more CPI scores than non-paan chewers. But this association is not statistically significant. Paan chewers had more Loss of Attachment than non-paan chewers. This association was also not statistically significant. (Tables 18A and 18B) (Graph18).

Smokeless tobacco users had more Plaque Index and CPI score than non-users. But this association was not statistically significant. Smokeless tobacco users had more attachment loss than non-users. This association was not statistically significant. (Tables19A and 19B) (Graph 19).

Alcohol users had more Plaque Index scores, CPI scores and Loss of Attachment than non- alcohol users. All these associations were found to be statistically significant. (Tables 20A and 20B) (Graph20).

The tables (21A and 21B) (Graph 21) shows that association between Plaque Index and oral hygiene awareness, which was found to be highly significant.

(Table 22A) (Graph 22A) shows the percentage of smokers in the population. 75.9% of the population was non–smokers, whereas 22.4% were light smokers and 1.7% was heavy smokers. Irrespective of frequency of smoking, highest number of people had fair to poor Plaque Index scores. It is highly significant at the level of 5% (Tables 22B and 22C) (Graph22B).

Table 23A shows cross tabulation of frequency of smoking and CPI and Table 23B shows Chi-Square Tests for association of frequency of smoking and CPI. 60% (3) of the heavy smokers had shallow periodontal pocket between 4-5mm, whereas 69.1% (47) of light smokers had abundant presence of calculus. This association was not statistically significant.

Table 24 A shows cross tabulation of frequency of smoking and Loss of Attachment and Table 24 B shows Chi-Square Tests for association of frequency of smoking and Loss of Attachment. 40% (2) of the heavy smokers and 41.2% (28) of the light smokers had the Loss of Attachment of 9-11mm, whereas in non–smokers 33.2% (76) of the people had no Loss of Attachment. This association between frequency of smoking and Loss of Attachment was highly significant.

When Loss of Attachment in all the 6 sextants was compared, the maxillary right posterior teeth (14-18) had more severe Loss of Attachment than the other sextants. (Table 25).

When CPI scores in all the 6 sextants were compared, the mandibular left posterior teeth (34- 38) had the highest percentage of deep periodontal pockets ≥ 6mm and maxillary right posterior teeth had the highest percentage of shallow periodontal pockets of 4-5mm (Table 26).

When regression analysis was done with Loss of Attachment as a dependent variable, it was significantly associated with age, smoking and alcohol (Table 27). When regression analysis was done with CPI as a dependent variable, none of the variables were significantly associated (Table 28).

Table 1

Showing the Total Number of Population

Ethnic group			Sex		
			Sex		Total
			Male	Female	
Ethnic group	Paniya	Count	43	91	134
		% within E. group	32.1%	67.9%	100.0%
	Mullakurumba	Count	11	10	21
		% within E. group	52.4%	47.6%	100.0%
	Bettakurumba	Count	37	43	80
		% within E. group	46.3%	53.8%	100.0%
	Irula	Count	1	2	3
		% within E. group	33.3%	66.7%	100.0%
	Kattunayakans	Count	34	31	65
		% within E. group	52.3%	47.7%	100.0%
Total		Count	126	177	303
		% within E. group	41.6%	58.4%	100.0%

Table 2

Showing the Average Age of the Population

Mean	
Sex	**Age**
Male	39.8413
Female	38.9605
Total	39.3267

Table 3

Shows Prevalence of Periodontal Diseases Based on CPI

CPI			
		Frequency	**Percent**
Valid	**Healthy**	6	2.0
	Bleeding on probing	1	.3
	Calculus	228	75.2
	P.Pocket 4-5mm	48	15.8
	P.Pocket ≥ 6mm	19	6.3
	Total	302	99.7
	Excluded sextant	1	.3
Total		303	100.0

Table 4

Shows Prevalence of Periodontal Diseases Based on Loss of Attachment

Loss of Attachment			
mm		**Frequency**	**Percent**
Valid	**0-3**	80	26.4
	4-5	56	18.5
	6-8	67	22.1
	9-11	72	23.8
	≥12	27	8.9
	Total	302	99.7
	Excluded Sextant	1	.3
Total		303	100.0

Table 5

Shows Loss of Attachment with the Gender Group

		Male		Female	
	mm	**Frequency**	**Percent**	**Frequency**	**Percent**
Valid	**0-3**	12	9.5	68	38.4
	4-5	19	15.1	37	20.9
	6-8	36	28.6	31	17.5
	9-11	42	33.3	30	16.9
	≥12	17	13.5	10	5.6
	Total	126	100	176	99.4
	Excluded Sextant			1	.6
	Total	126	100	177	100.0

Table 6

Shows CPI with the Gender Group

		Male		Female	
		Frequency	**Percent**	**Frequency**	**Percent**
Valid	**Healthy**	1	.8	5	2.8
	Bleeding			1	.6
	Calculus	87	69	141	79.7
	P.pocket 4-5mm	28	22.2	20	11.3
	P.pocket ≥6	10	7.9	9	5.1
	Total	126	100	176	99.4
	Excluded sextant			1	.6
	Total	126	100	177	100

Table 7A

Showing Cross Tabulation of Plaque Index and CPI

Crosstab								
			CPI					Total
			Healthy	Bleeding On probing	Calculus	P.Pocket 4-5mm	P.Pocket ≥6mm	
Plaque Index	Excellent	Count			1			1
		% within Plaque Index			100.0%			100.0%
	Good	Count	6		63	2	2	73
		% within Plaque Index	8.2%		86.3%	2.7%	2.7%	100.0%
	Fair	Count		1	143	39	12	195
		% within Plaque Index		.5%	73.3%	20.0%	6.2%	100.0%
	Poor	Count			21	7	5	33
		% within Plaque Index			63.6%	21.2%	15.2%	100.0%
Total		Count	6	1	228	48	19	302
		% within Plaque Index	2.0%	.3%	75.5%	15.9%	6.3%	100.0%

Table 7B

Showing Chi-Square Tests for Association of Plaque Index and CPI

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	37.727(a)	12	.000
Likelihood Ratio	39.702	12	.000
Linear-by-Linear Association	24.180	1	.000
N of Valid Cases	302		

Table 8A

Showing Cross Tabulation of Plaque Index and Loss of Attachment

Crosstab

			Loss of Attachment (mm)					Total
			0-3	4-5	6-8	9-11	≥12	
Plaque Index	Excellent	Count	1					1
		% within Plaque Index	100.0%					100.0%
	Good	Count	50	9	11	1	2	73
		% within Plaque Index	68.5%	12.3%	15.1%	1.4%	2.7%	100.0%
	Fair	Count	27	46	52	54	16	195
		% within Plaque Index	13.8%	23.6%	26.7%	27.7%	8.2%	100.0%
	Poor	Count	2	1	4	17	9	33
		% within Plaque Index	6.1%	3.0%	12.1%	51.5%	27.3%	100.0%
Total		Count	80	56	67	72	27	302
		% within Plaque Index	26.5%	18.5%	22.2%	23.8%	8.9%	100.0%

Table 8B

Showing Chi-Square Tests for Association of Plaque Index and Loss of Attachment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	124.718(a)	12	.000
Likelihood Ratio	122.937	12	.000
Linear-by-Linear Association	85.988	1	.000
N of Valid Cases	302		

Table 9A

Showing Cross Tabulation of Oral Hygiene Measures and CPI

Crosstab								
			CPI					Total
			Healthy	Bleeding On probing	Calculus	P.Pocket 4-5mm	P.Pocket ≥6mm	
OH-Measures	Brush	Count	5		71	19	10	105
		% within OH-Measures	4.8%		67.6%	18.1%	9.5%	100.0%
	Finger	Count	1	1	157	29	9	197
		% within OH-Measures	.5%	.5%	79.7%	14.7%	4.6%	100.0%
Total		Count	6	1	228	48	19	302
		% within OH-Measures	2.0%	.3%	75.5%	15.9%	6.3%	100.0%

Table 9B

Showing Chi-Square Tests for Association of Oral Hygiene Measures and CPI

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.260(a)	4	.024
Likelihood Ratio	11.227	4	.024
Linear-by-Linear Association	.438	1	.508
N of Valid Cases	302		

Table 10A

Showing Cross Tabulation of Oral Hygiene Measures and Loss of Attachment

Crosstab								
			Loss of attachment (mm)					Total
			0-3	4-5	6-8	9-11	≥12	
OH-Measures	Brush	Count	38	23	22	18	4	105
		% within OH-Measures	36.2%	21.9%	21.0%	17.1%	3.8%	100.0%
	Finger	Count	42	33	45	54	23	197
		% within OH-Measures	21.3%	16.8%	22.8%	27.4%	11.7%	100.0%
Total		Count	80	56	67	72	27	302
		% within OH-Measures	26.5%	18.5%	22.2%	23.8%	8.9%	100.0%

Table 10B

Showing Chi-Square Tests for Association of Oral Hygiene Measures and Loss of Attachment

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.578(a)	4	.006
Likelihood Ratio	15.192	4	.004
Linear-by-Linear Association	14.447	1	.000
N of Valid Cases	302		

Table 11A

Showing Cross Tabulation of Oral Hygiene Measures and Plaque Index

Crosstab							
			Plaque Index				Total
			Excellent	Good	Fair	Poor	
OH-Measures	Brush	Count	1	35	63	6	105
		% within OH-Measures	1.0%	33.3%	60.0%	5.7%	100.0%
	Finger	Count		38	133	27	198
		% within OH-Measures		19.2%	67.2%	13.6%	100.0%
Total		Count	1	73	196	33	303
		% within OH-Measures	.3%	24.1%	64.7%	10.9%	100.0%

Table 11B

Showing Chi-Square Tests for Association of Oral Hygiene Measures and Plaque Index

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.080(a)	3	.007
Likelihood Ratio	12.514	3	.006
Linear-by-Linear Association	11.427	1	.001
N of Valid Cases	303		

Table 12A

Showing Cross Tabulation of Dentifrices and CPI

Crosstab								
			CPI					Total
			Healthy	Bleeding On Probing	Calculus	P.Pocket 4-5mm	P.Pocket ≥6mm	
Dentifrices	Tooth paste	Count	5		53	14	5	77
		% within dentifrices	6.5%		68.8%	18.2%	6.5%	100.0%
	Tooth powder	Count			47	9	5	61
		% within dentifrices			77.0%	14.8%	8.2%	100.0%
	Charcoal	Count	1	1	128	25	9	164
		% within dentifrices	.6%	.6%	78.0%	15.2%	5.5%	100.0%
Total		Count	6	1	228	48	19	302
		% within dentifrices	2.0%	.3%	75.5%	15.9%	6.3%	100.0%

Table 12B

Showing Chi-Square Tests for Association of Dentifrices and CPI

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.977(a)	8	.113
Likelihood Ratio	12.168	8	.144
Linear-by-Linear Association	.262	1	.609
N of Valid Cases	302		

Table 13A

Showing Cross Tabulation of Dentifrices and Loss of Attachment

Crosstab								
			Loss of Attachment (mm)					Total
			0-3	4-5	6-8	9-11	≥12	
Dentifrices	Tooth paste	Count	28	17	17	11	4	77
		% within dentifrices	36.4%	22.1%	22.1%	14.3%	5.2%	100.0%
	Tooth powder	Count	15	9	15	19	3	61
		% within dentifrices	24.6%	14.8%	24.6%	31.1%	4.9%	100.0%
	Charcoal	Count	37	30	35	42	20	164
		% within dentifrices	22.6%	18.3%	21.3%	25.6%	12.2%	100.0%
Total		Count	80	56	67	72	27	302
		% within dentifrices	26.5%	18.5%	22.2%	23.8%	8.9%	100.0%

Table 13B
Showing Chi-Square Tests for Association of Dentifrices and Loss of Attachment

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.867(a)	8	.085
Likelihood Ratio	14.229	8	.076
Linear-by-Linear Association	8.839	1	.003
N of Valid Cases	302		

Table 14A

Showing Cross Tabulation of Dentifrices and Plaque Index

Crosstab							
			Plaque Index				Total
			Excellent	Good	Fair	Poor	
Dentifrices	Tooth paste	Count	1	27	46	3	77
		% within dentifrices	1.3%	35.1%	59.7%	3.9%	100.0%
	Tooth powder	Count		11	44	6	61
		% within dentifrices		18.0%	72.1%	9.8%	100.0%
	Charcoal	Count		35	106	24	165
		% within dentifrices		21.2%	64.2%	14.5%	100.0%
Total		Count	1	73	196	33	303
		% within dentifrices	.3%	24.1%	64.7%	10.9%	100.0%

Table 14B

Showing Chi-Square Tests for Association of Dentifrices and Plaque Index

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.645(a)	6	.023
Likelihood Ratio	15.025	6	.020
Linear-by-Linear Association	9.907	1	.002
N of Valid Cases	303		

Table 15A

Showing Cross Tabulation of Food and CPI

Crosstab								
			CPI					Total
			Healthy	Bleeding On probing	Calculus	P.Pocket 4-5mm	P.Pocket ≥6mm	
Food	Non-veg	Count	6	1	222	48	18	295
		% within food	2.0%	.3%	75.3%	16.3%	6.1%	100.0%
	Veg	Count			6		1	7
		% within food			85.7%		14.3%	100.0%
Total		Count	6	1	228	48	19	302
		% within food	2.0%	.3%	75.5%	15.9%	6.3%	100.0%

Table 15B

Showing Chi-Square Tests for Association Food and CPI

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.132(a)	4	.711
Likelihood Ratio	3.213	4	.523
Linear-by-Linear Association	.032	1	.859
N of Valid Cases	302		

Table 16A

Showing Cross Tabulation of Food and Loss of Attachment

Crosstab								
			Loss of Attachment (mm)					Total
			0-3	4-5	6-8	9-11	≥12	
Food	Non-veg	Count	79	55	66	69	26	295
		% within food	26.8%	18.6%	22.4%	23.4%	8.8%	100.0%
	Veg	Count	1	1	1	3	1	7
		% within food	14.3%	14.3%	14.3%	42.9%	14.3%	100.0%
Total		Count	80	56	67	72	27	302
		% within food	26.5%	18.5%	22.2%	23.8%	8.9%	100.0%

Table 16B

Showing Chi-Square Tests for Association Food and Loss of Attachment

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.990(a)	4	.738
Likelihood Ratio	1.865	4	.761
Linear-by-Linear Association	1.389	1	.239
N of Valid Cases	302		

Table 17A

Shows the Group Statistics of the Indices with Smoking Habit

Group Statistics					
	Smoking	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Plaque Index	**Yes**	73	3.1644	.50038	.05857
	No	230	2.7652	.58108	.03832
CPI	**Yes**	73	2.4247	.66495	.07783
	No	229	2.1834	.64989	.04295
Loss of Attachment	**Yes**	73	2.4795	1.02888	.12042
	No	229	1.4541	1.31584	.08695

Table 17 B

Shows Independent Samples t-Test for Comparing Smokers and Non-Smokers on Periodontal Disease

Independent Samples Test										
		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**Df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Plaque Index	**Equal variances assumed**	5.780	.017	5.279	301	.000	.3992	.07561	.25038	.54795
	Equal variances not assumed			5.704	138.828	.000	.3992	.06999	.26079	.53754
CPI	**Equal variances assumed**	6.365	.012	2.746	300	.006	.2413	.08784	.06839	.41411
	Equal variances not assumed			2.714	119.038	.008	.2413	.08889	.06524	.41726
Loss of Attach -ment	**Equal variances assumed**	14.852	.000	6.088	300	.000	1.0253	.16841	.69389	1.35672
	Equal variances not assumed			6.903	153.478	.000	1.0253	.14853	.73187	1.31874

Table 18A

Shows the Group Statistics of the Indices with Paan Chewing Habit

Group Statistics					
	Pan Chewing	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Plaque Index	**Yes**	208	2.8990	.54231	.03760
	No	95	2.7789	.67128	.06887
CPI	**Yes**	208	2.2837	.63041	.04371
	No	94	2.1489	.71778	.07403
Loss of Attachment	**Yes**	208	1.8125	1.29228	.08960
	No	94	1.4574	1.37305	.14162

Table 18 B

Shows Independent Samples t-Test for Comparing Paan Chewers and Non-Paan Chewers on Periodontal Disease

Independent Samples Test										
		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**Df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Plaque Index	**Equal variances assumed**	13.796	.000	1.656	301	.099	.1201	.07252	-.02262	.26280
	Equal variances not assumed			1.530	152.251	.128	.1201	.07847	-.03494	.27512
CPI	**Equal variances assumed**	.210	.647	1.646	300	.101	.1347	.08187	-.02639	.29583
	Equal variances not assumed			1.567	160.383	.119	.1347	.08597	-.03507	.30451
Loss of Attach -ment	**Equal variances assumed**	2.502	.115	2.168	300	.031	.3551	.16378	.03274	.67737
	Equal variances not assumed			2.119	170.115	.036	.3551	.16759	.02424	.68587

Table 19A

Shows the Group Statistics of the Indices with Habit of Smokeless Tobacco

Group Statistics					
	Smokeless Tobacco	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Plaque Index	**Yes**	183	2.8907	.56361	.04166
	No	120	2.8167	.62151	.05674
CPI	**Yes**	183	2.2732	.62167	.04596
	No	119	2.1933	.71636	.06567
Loss of Attachment	**Yes**	183	1.8306	1.32131	.09767
	No	119	1.5042	1.31403	.12046

Table 19 B

Shows Independent Samples t-Test for Comparing Smokeless Tobacco Users and Non-Users on Periodontal Disease

Independent Samples Test										
		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**Df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Plaque Index	**Equal variances assumed**	3.652	.057	1.074	301	.284	.0740	.06897	-.06169	.20977
	Equal variances not assumed			1.052	236.904	.294	.0740	.07039	-.06463	.21271
CPI	**Equal variances assumed**	.017	.898	1.028	300	.305	.0799	.07779	-.07313	.23302
	Equal variances not assumed			.997	226.635	.320	.0799	.08015	-.07799	.23788
Loss of Attach-ment	**Equal variances assumed**	.232	.631	2.102	300	.036	.3264	.15526	.02086	.63194
	Equal variances not assumed			2.105	253.211	.036	.3264	.15508	.02099	.63181

Table 20A

Shows the Group Statistics of the Indices with Habit of Alcohol Use

Group Statistics					
	Alcohol	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Plaque Index	**Yes**	121	3.0744	.53487	.04862
	No	182	2.7198	.57914	.04293
CPI	**Yes**	121	2.3636	.67082	.06098
	No	181	2.1602	.64271	.04777
Loss of Attachment	**Yes**	121	2.2893	1.12870	.10261
	No	181	1.3094	1.30528	.09702

Table 20 B

Shows Independent Samples t-Test for Comparing Alcohol Users and Non-Alcohol Users on Periodontal Disease

Independent Samples Test										
		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**Df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Plaque Index	**Equal variances assumed**	14.550	.000	5.380	301	.000	.3546	.06591	.22489	.48431
	Equal variances not assumed			5.467	270.869	.000	.3546	.06486	.22690	.48230
CPI	**Equal variances assumed**	8.180	.005	2.648	300	.009	.2034	.07681	.05226	.35457
	Equal variances not assumed			2.626	249.763	.009	.2034	.07747	.05084	.35599
Loss of Attach-ment	**Equal variances assumed**	7.559	.006	6.742	300	.000	.9799	.14534	.69385	1.26587
	Equal variances not assumed			6.939	280.836	.000	.9799	.14121	.70189	1.25784

Table 21A

Shows the Group Statistics of the Indices with Awareness

Group Statistics					
	Awareness	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Plaque Index	**Aware**	35	2.7429	.70054	.11841
	Unaware	267	2.8764	.57164	.03498
CPI	**Aware**	35	2.2286	.87735	.14830
	Unaware	266	2.2444	.62981	.03862
Loss of Attachment	**Aware**	35	1.5429	1.35783	.22951
	Unaware	266	1.7218	1.32525	.08126

Table 21B

Shows Independent Samples t-Test for Comparing Awareness on Periodontal Disease

Independent Samples Test							
		Levene's Test for Equality of Variances		**t-test for Equality of Means**			
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**
Plaque Index	**Equal variances assumed**	4.906	.028	-1.264	300	.207	-.1335
	Equal variances not assumed			-1.082	40.155	.286	-.1335
CPI	**Equal variances assumed**	2.484	.116	-.133	299	.895	-.0158
	Equal variances not assumed			-.103	38.744	.918	-.0158
Loss of Attachment	**Equal variances assumed**	.240	.624	-.749	299	.455	-.1789
	Equal variances not assumed			-.735	42.971	.466	-.1789

Table 22 A

Shows the Percentage of Smokers in the Population

		Frequency	Percent
Valid	Non smoker	230	75.9
	Light smoker	68	22.4
	Heavy smoker	5	1.7
	Total	303	100.0

Table 22B

Showing Cross Tabulation of Frequency of Smoking and Plaque Index

Crosstab

			Plaque Index				Total
			Excellent	Good	Fair	Poor	
Smoker type	Non smoker	Count	1	69	143	17	230
		% within frequency of smoking	.4%	30.0%	62.2%	7.4%	100.0%
	Light smoker	Count		3	49	16	68
		% within frequency of smoking		4.4%	72.1%	23.5%	100.0%
	Heavy smoker	Count		1	4		5
		% within frequency of smoking		20.0%	80.0%		100.0%
Total		Count	1	73	196	33	303
		% within frequency of smoking	.3%	24.1%	64.7%	10.9%	100.0%

Table 22 C

Showing Chi-Square Tests for Association of Frequency of Smoking and Plaque Index

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	28.697(a)	6	.000
Likelihood Ratio	32.673	6	.000
Linear-by-Linear Association	20.305	1	.000
N of Valid Cases	303		

Table 23A

Showing Cross Tabulation of Frequency of Smoking and CPI

Crosstab

			CPI					Total
			Healthy	Bleeding On probing	Calculus	P.Pocket 4-5mm	P.Pocket ≥6mm	
Frequency of smoking	**Non smoker**	**Count**	6	1	179	31	12	229
		% within frequency of smoking	2.6%	.4%	78.2%	13.5%	5.2%	100.0%
	Light smoker	**Count**			47	14	7	68
		% within frequency of smoking			69.1%	20.6%	10.3%	100.0%
	Heavy smoker	**Count**			2	3		5
		% within frequency of smoking			40.0%	60.0%		100.0%
Total		**Count**	6	1	228	48	19	302
		% within frequency of smoking	2.0%	.3%	75.5%	15.9%	6.3%	100.0%

Table 23 B

Showing Chi-Square Tests for Association of Frequency of Smoking and CPI

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.960(a)	8	.083
Likelihood Ratio	13.244	8	.104
Linear-by-Linear Association	7.747	1	.005
N of Valid Cases	302		

Table 24 A

Showing Cross Tabulation of Frequency of Smoking and Loss of Attachment

Crosstab								
			Loss of Attachment (mm)					Total
			0-3	4-5	6-8	9-11	≥12	
Frequency of smoking	Non smoker	Count	76	49	45	42	17	229
		% within frequency of smoking	33.2%	21.4%	19.7%	18.3%	7.4%	100.0%
	Light smoker	Count	4	6	20	28	10	68
		% within frequency of smoking	5.9%	8.8%	29.4%	41.2%	14.7%	100.0%
	Heavy smoker	Count		1	2	2		5
		% within frequency of smoking		20.0%	40.0%	40.0%		100.0%
Total		Count	80	56	67	72	27	302
		% within frequency of smoking	26.5%	18.5%	22.2%	23.8%	8.9%	100.0%

Table 24 B

Showing Chi-Square Tests for Association of Frequency of Smoking and Loss of Attachment

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	39.149(a)	8	.000
Likelihood Ratio	44.482	8	.000
Linear-by-Linear Association	29.423	1	.000
N of Valid Cases	302		

Table 25
Showing Sextants with Loss of Attachment (mm)

Maxillary right $1^{st}/2^{nd}$ Molar	Count	%	Maxillary right central incisor	Count	%	Maxillary left $1^{st}/2^{nd}$ molar	Count	%
0-3	109	37.33	0	195	65.88	0	120	40.4
4-5	62	21.23	1	42	14.19	1	56	18.86
6-8	63	21.58	2	45	15.2	2	78	26.26
9-11	50	17.12	3	12	4.05	3	34	11.45
≥12	**6**	**2.05**	**4**	**2**	**0.68**	**4**	**5**	**1.68**
Not recorded	2	0.68	N=	296	9	4	1.35	
	N=	292	*=	7	N=	297		
Excluded sextant	*=	11	*=	6				
Mandibular left $1^{st}/2^{nd}$ molar	Count	%	Mandibular left central incisor	Count	%	Mandibular right $1^{st}/2^{nd}$ molar	Count	%
0-3	155	52.01	0	157	52.68	0	168	56.76
4-5	50	16.78	1	55	18.46	1	38	12.84
6-8	48	16.11	2	55	18.46	2	49	16.55
9-11	38	12.75	3	24	8.05	3	32	10.81
≥12	**6**	**2.01**	**4**	**5**	**1.68**	**4**	**6**	**2.03**
Not recorded	1	0.34	9	2	0.67	9	3	1.01
	N=	298	N=	298	N=	296		
	*=	5	*=	5	*=	7		

Table 26

Showing Sextants with CPI Score

Maxillary right 1st/2nd molar	Count	%	Maxillary right central incisor	Count	%	Maxillary left 1st/2nd molar	Count	%
Healthy	7	2.4	0	26	8.75	0	5	1.69
Bleeding on probing	1	0.34	1	1	0.34	2	263	89.15
Calculus	252	86.3	2	250	84.18	3	19	6.44
P.Pocket 4-5mm	27	9.46	3	16	5.39	4	6	2.03
P.Pocket ≥6mm	3	1.03	4	3	1.01	9	2	0.68
Not recorded	2	0.68	9	1	0.34	N=	295	
N=	292	N=	297	*=	8			
Excluded sextant	11	*=	6					
Mandibular left 1st/2nd molar	Count	%	Mandibular left central incisor	Count	%	Mandibular right 1st/2nd molar	Count	%
Healthy	8	2.68	0	19	6.38	0	9	3.04
Bleeding on probing	0	0	1	1	0.34	1	0	0
Calculus	259	86.91	2	263	88.26	2	252	85.14
P.Pocket 4-5mm	21	7.05	3	5	2.9	3	28	9.25
P.Pocket ≥6mm	9	3.02	4	9	0.9	4	4	1.35
Not recorded	1	0.34	9	3	0.9	9	3	1.01
N=	298		298		N=	296		
Excluded sextant	5		5		7			

Table 27

Showing Regression Analysis of the Influence of Various Factors on Loss of Attachment

Coefficients(a)						
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	-.670	.835		-.802	.423
	Age	.134	.017	.378	7.861	.000
	Smoking	-.631	.202	-.204	-3.133	.002
	Paan Chewing	-.283	.235	-.099	-1.205	.229
	Smokeless Tobacco	-.310	.226	-.114	-1.372	.171
	Alcohol	-.606	.173	-.224	-3.499	.001
a Dependent Variable: Loss of Attachment						

Table 28

Showing Regression Analysis of the Influence of Various Factors on CPI

Coefficients(a)						
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	2.373	.498		4.761	.000
	Age	1.637E-02	.010	.093	1.612	.108
	Smoking	-.201	.120	-.130	-1.665	.097
	Paan Chewing	-.216	.140	-.152	-1.540	.125
	Smokeless Tobacco	2.223E-02	.135	.016	.165	.869
	Alcohol	-.106	.103	-.079	-1.029	.304
a Dependent Variable: CPI						

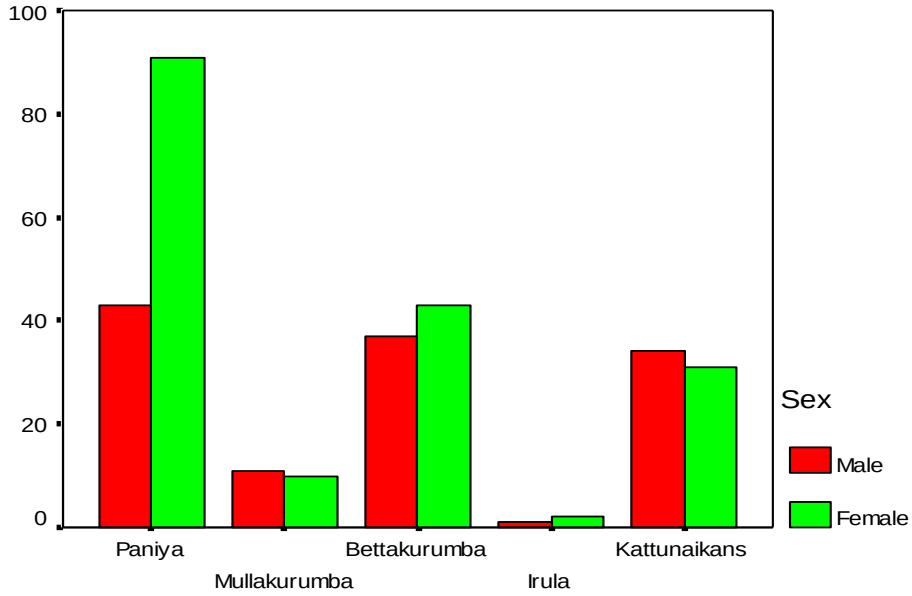
Table 29

Showing Regression Analysis of the Influence of Various Factors on Plaque Index

Coefficients(a)						
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	2.220	.403		5.512	.000
	Age	4.303E-02	.008	.275	5.229	.000
	Smoking	-.273	.098	-.199	-2.787	.006
	Paan Chewing	-.195	.114	-.154	-1.713	.088
	Smokeless Tobacco	-5.238E-03	.110	-.004	-.048	.962
	Alcohol	-.192	.084	-.160	-2.277	.024
a Dependent Variable: Plaque Index						

Graph 1

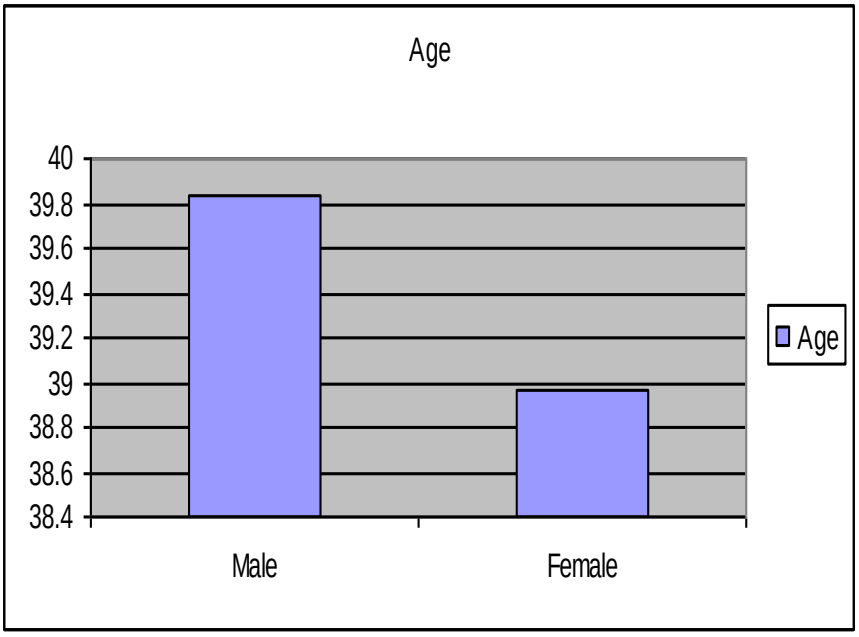
Showing the Total Number of Population



E. group

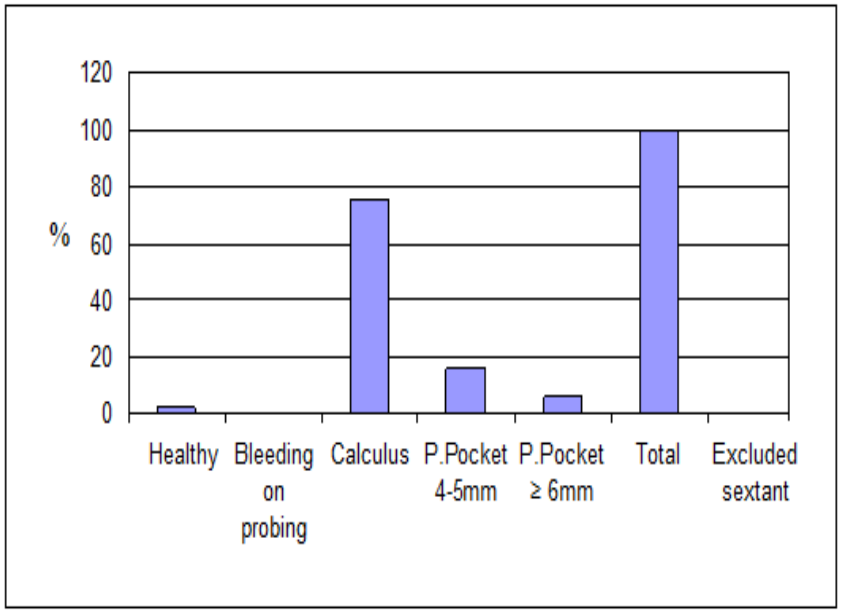
Graph 2

Showing the Average Age of the Population



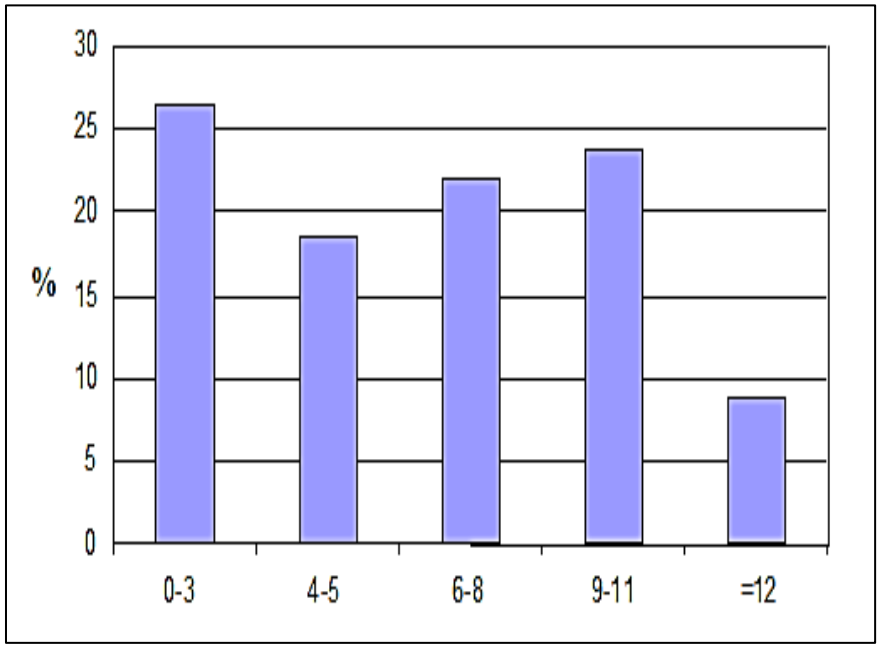
Graph 3

Shows Prevalence of Periodontal Diseases Based on CPI



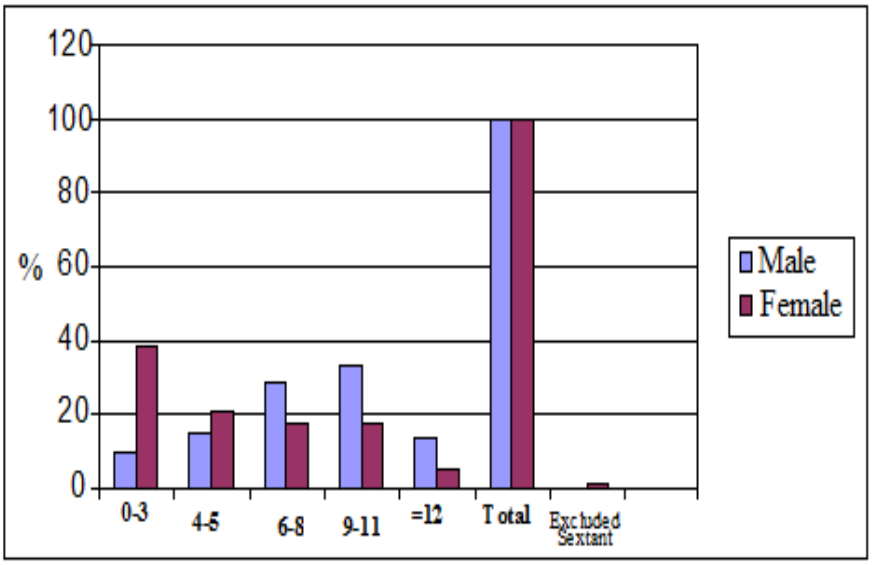
Graph 4

Shows Prevalence of Periodontal Diseases Based on Loss of Attachment



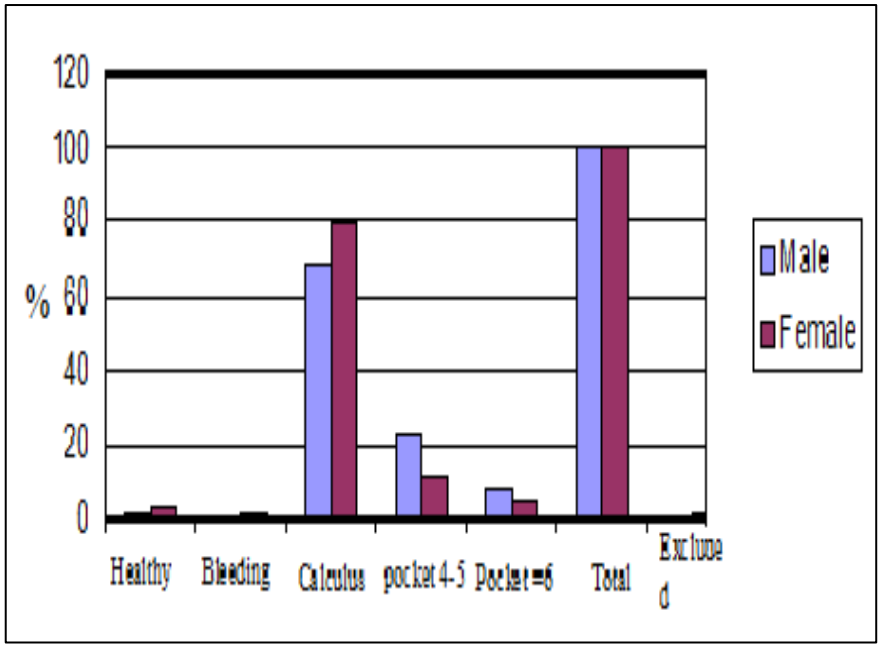
Graph 5

Shows Loss of Attachment with the Gender Group



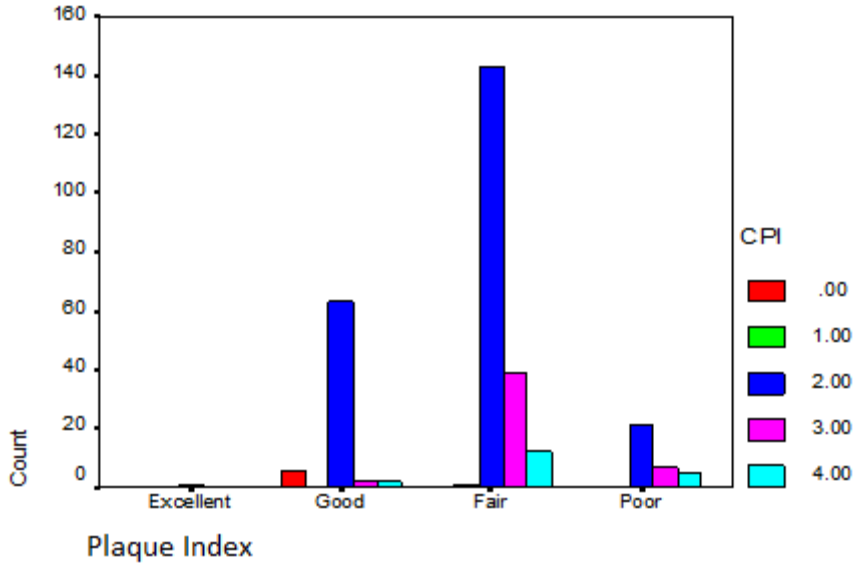
Graph 6

Shows CPI with the Gender Group



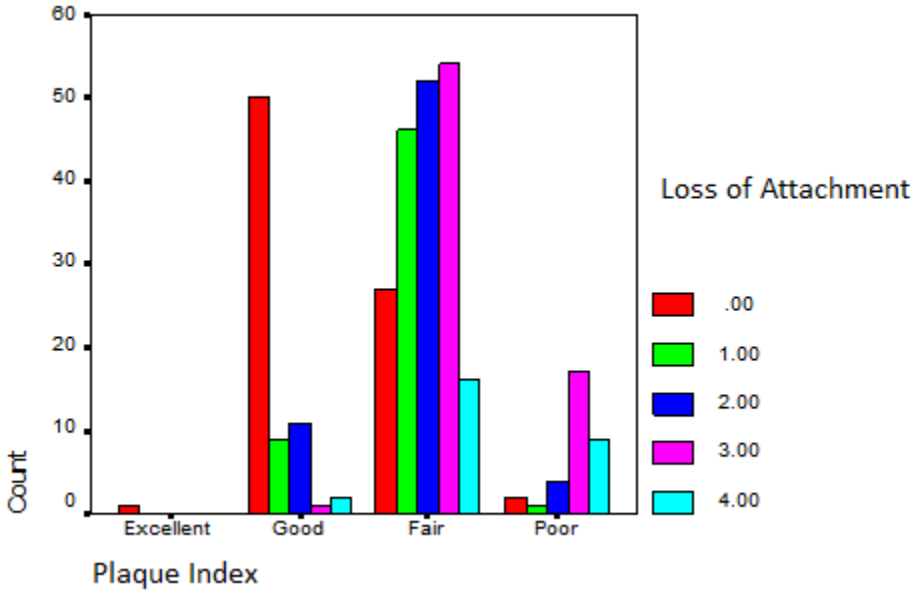
Graph 7

Showing Cross Tabulation of Plaque Index and CPI



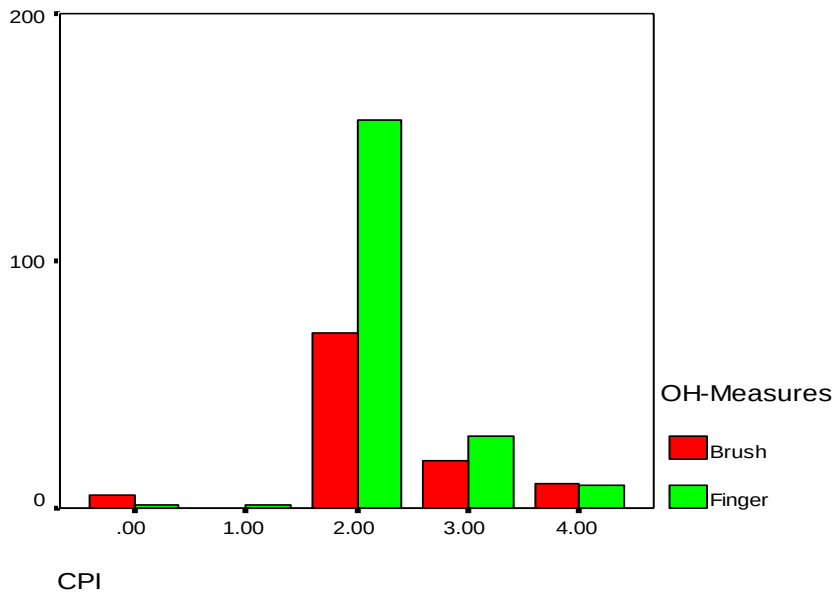
Graph 8

Showing Cross Tabulation of Plaque Index and Loss of Attachment



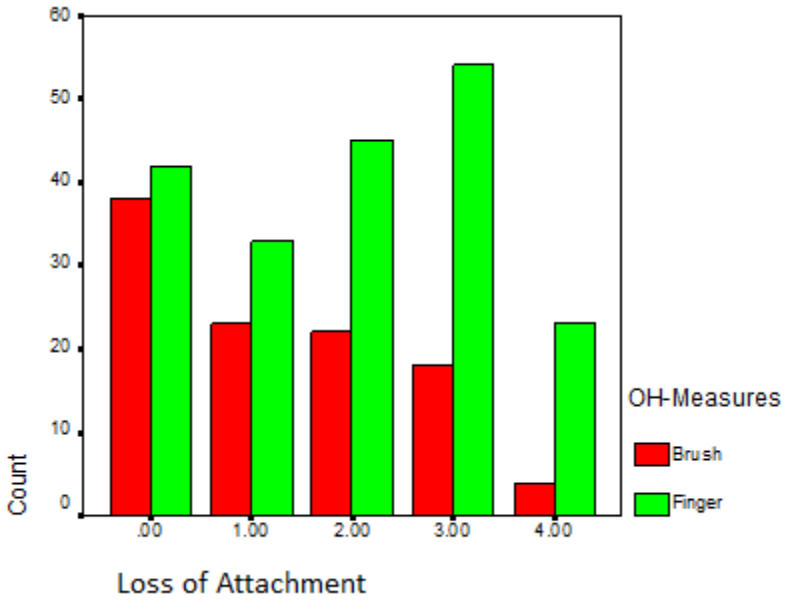
Graph 9

Showing Cross Tabulation of Oral Hygiene Measures and CPI



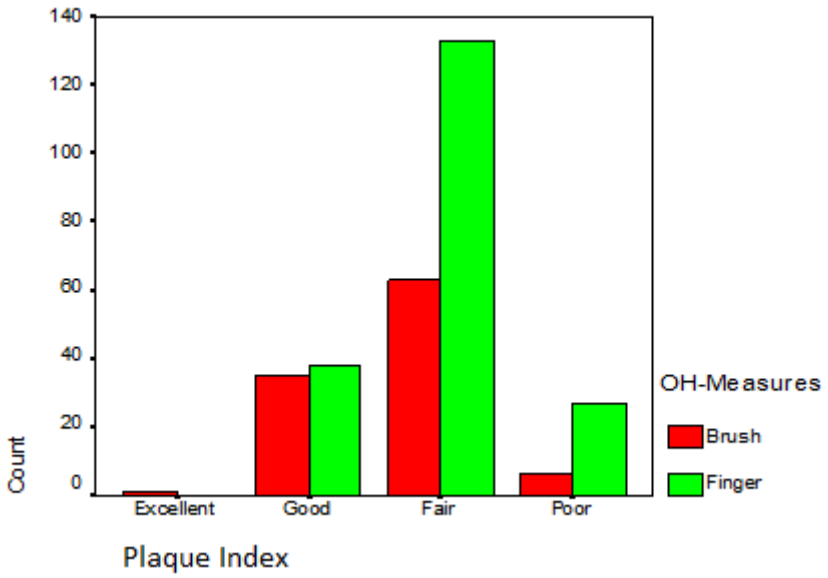
Graph 10

ShowingCross Tabulation of Oral Hygiene Measures and Loss of Attachment



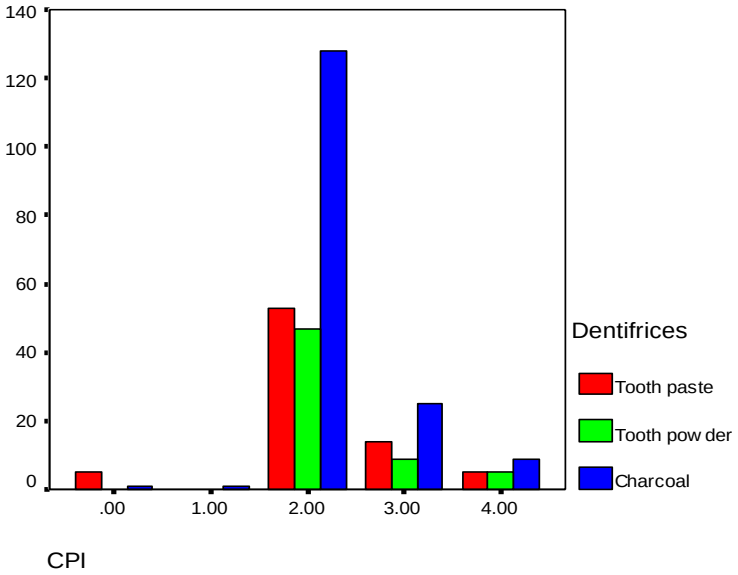
Graph 11

Showing Cross Tabulation of Oral Hygiene Measures and Plaque Index



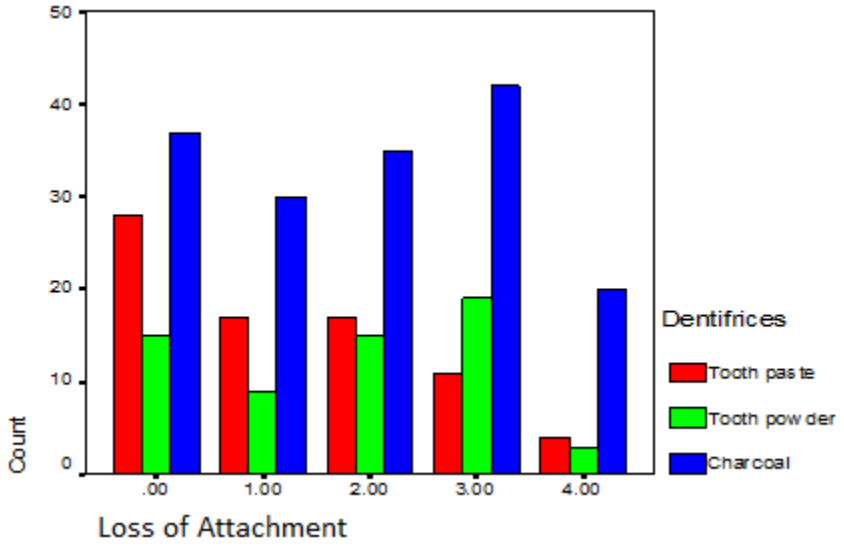
Graph 12

Showing Cross Tabulation of Dentifrices and CPI



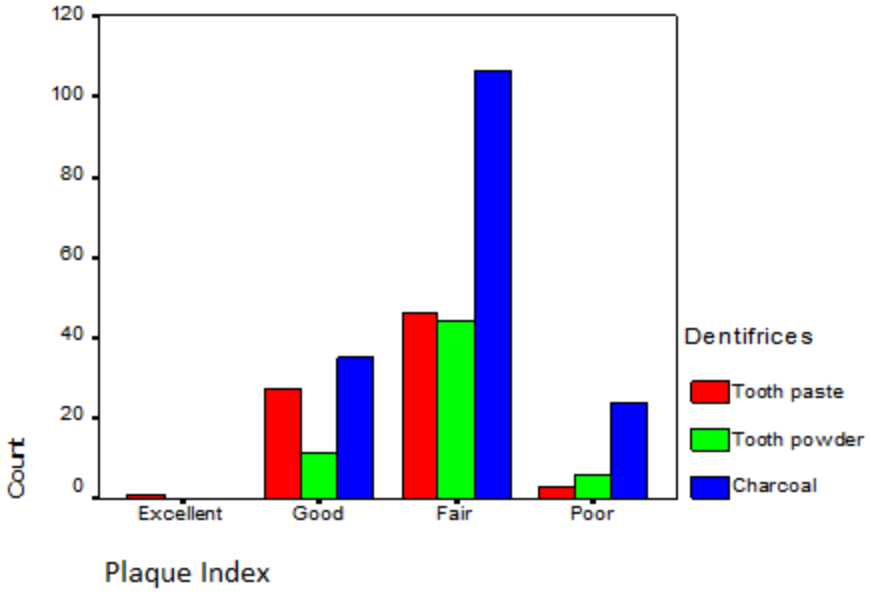
Graph 13

ShowingCross Tabulation of Dentifrices and Loss of Attachment



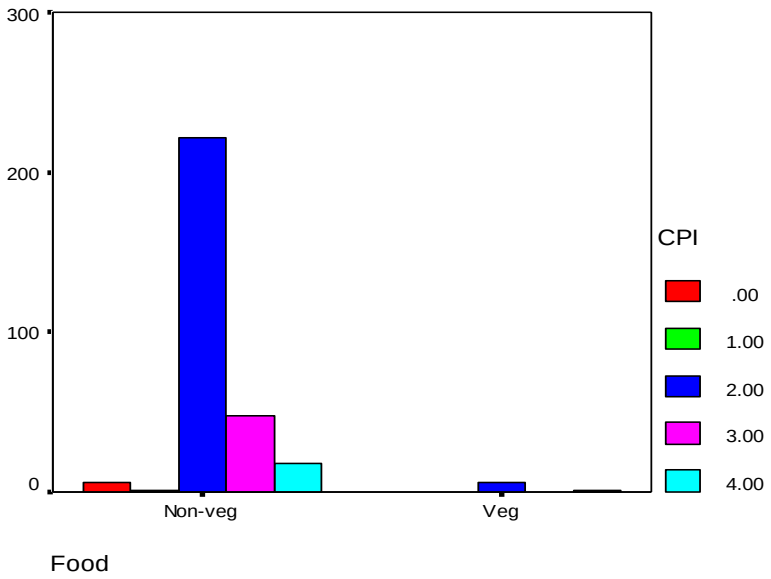
Graph 14

Showing Cross Tabulation of Dentifrices and Plaque Index



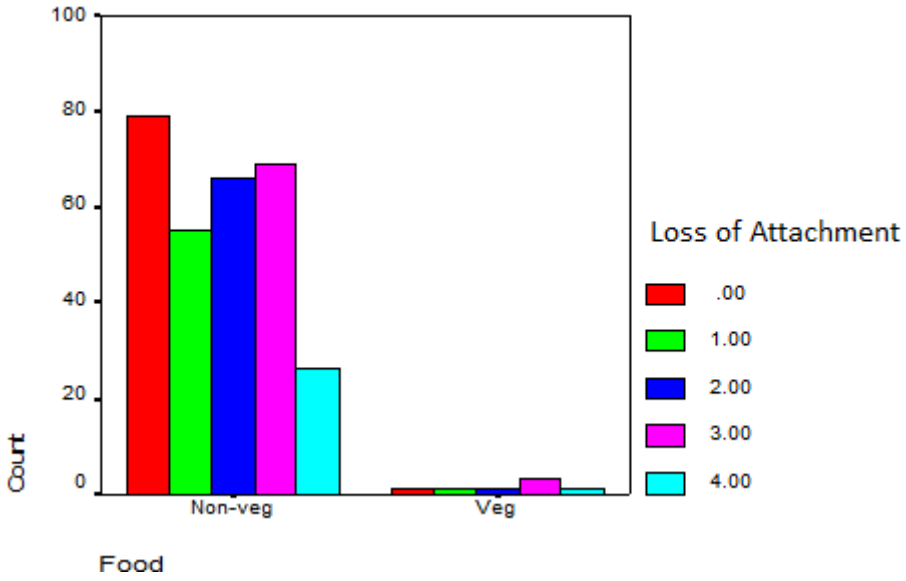
Graph15

Showing Cross Tabulation of Food and CPI



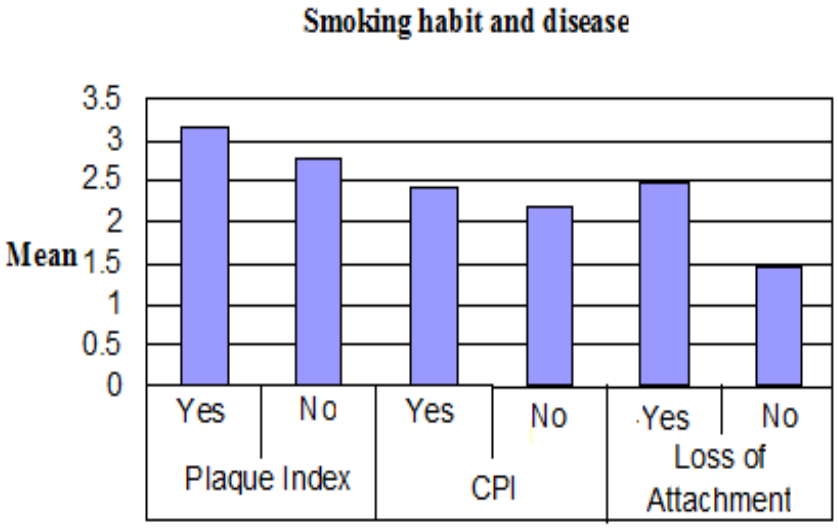
Graph 16

ShowingCross Tabulation of Foodand Loss of Attachment



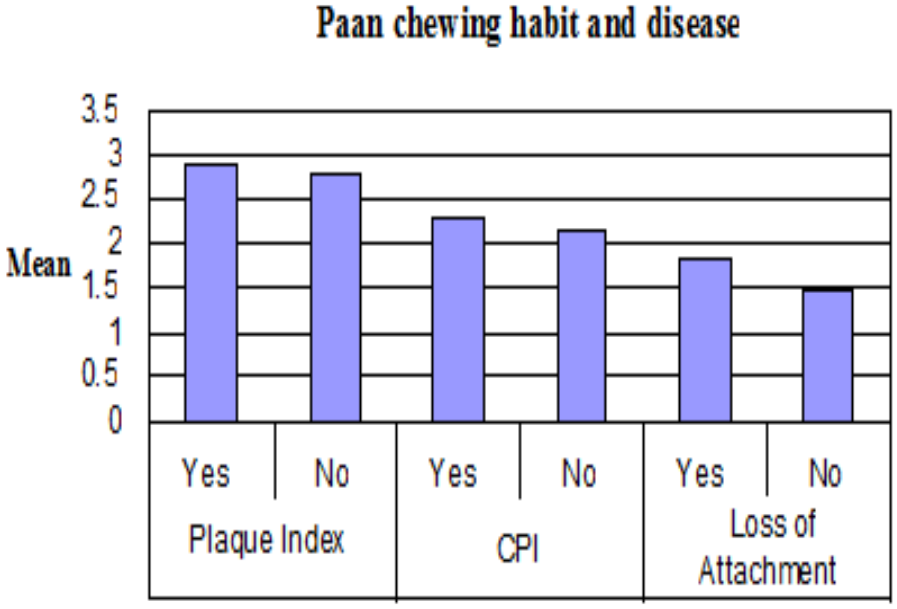
Graph 17

Shows the Group Statistics of the Indices with Smoking Habit



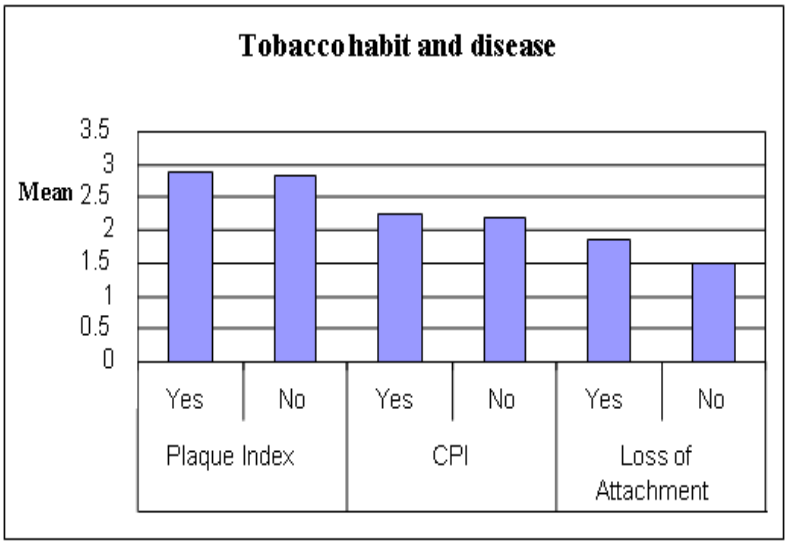
Graph18

Shows the Group Statistics of the Indices with PaanChewing Habit



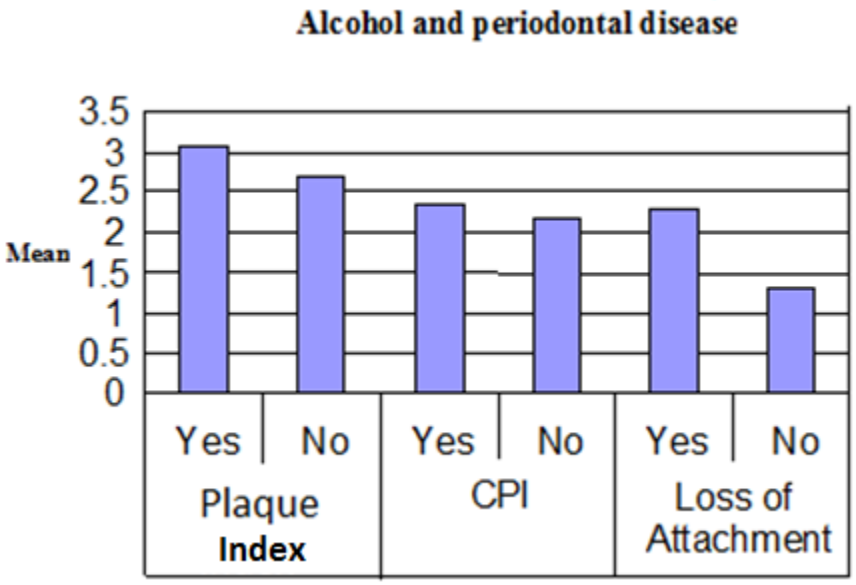
Graph 19

Shows the Group Statistics of the Indices with Habit of Smokeless Tobacco



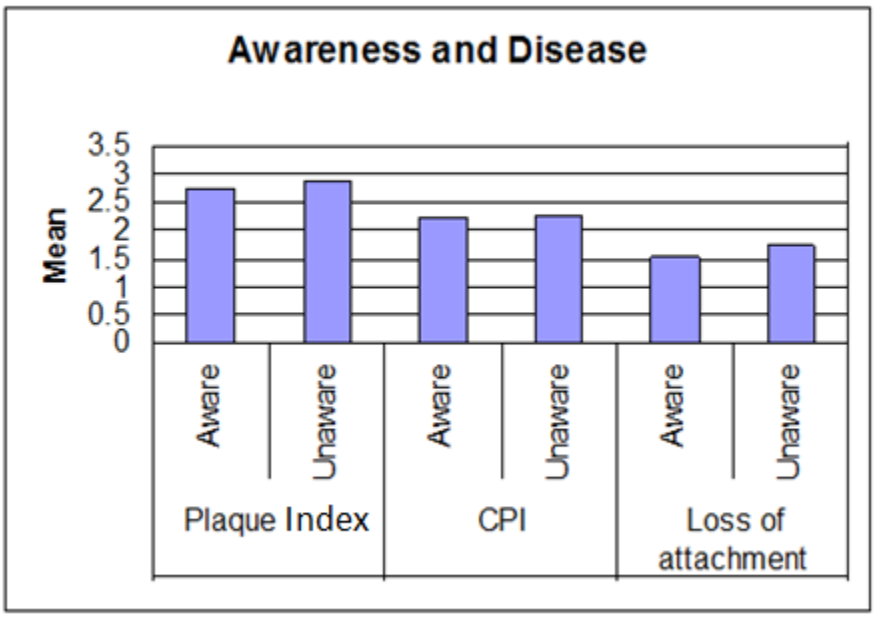
Graph 20

Shows the Group Statistics of the Indices with Habit of Alcohol Use



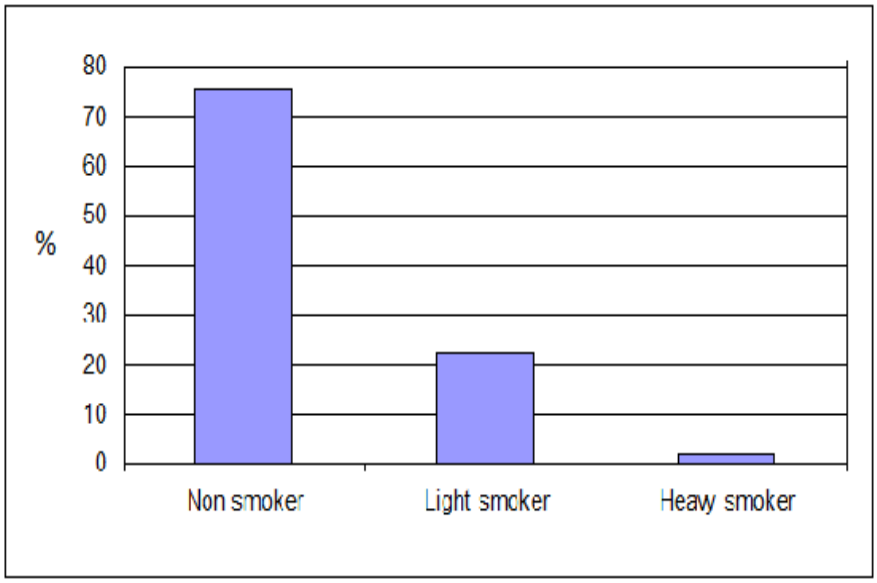
Graph 21

Shows the Group Statistics of the Indices with Awareness



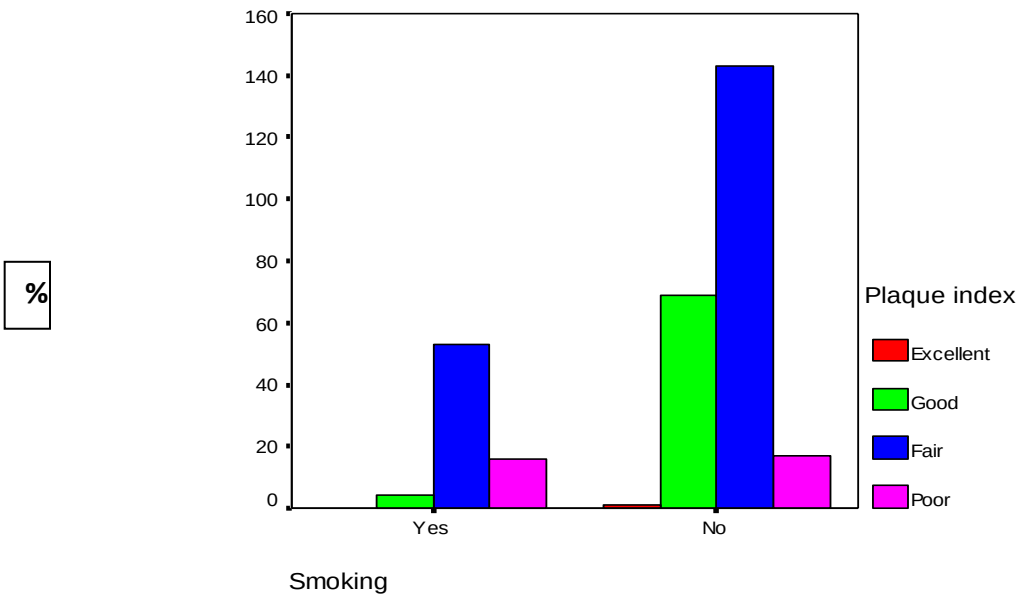
Graph 22A

Shows the Percentage of Smokers in the Population



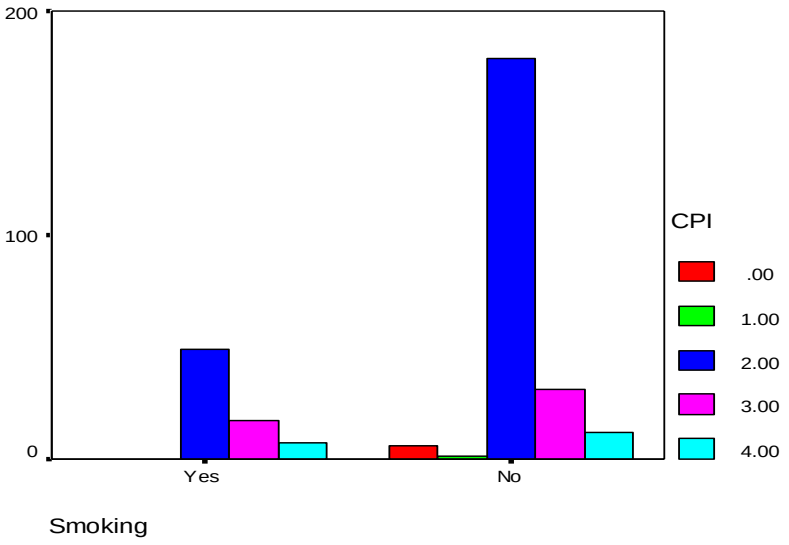
Graph 22 B

Showing Cross Tabulation of Frequency of Smoking and Plaque Index



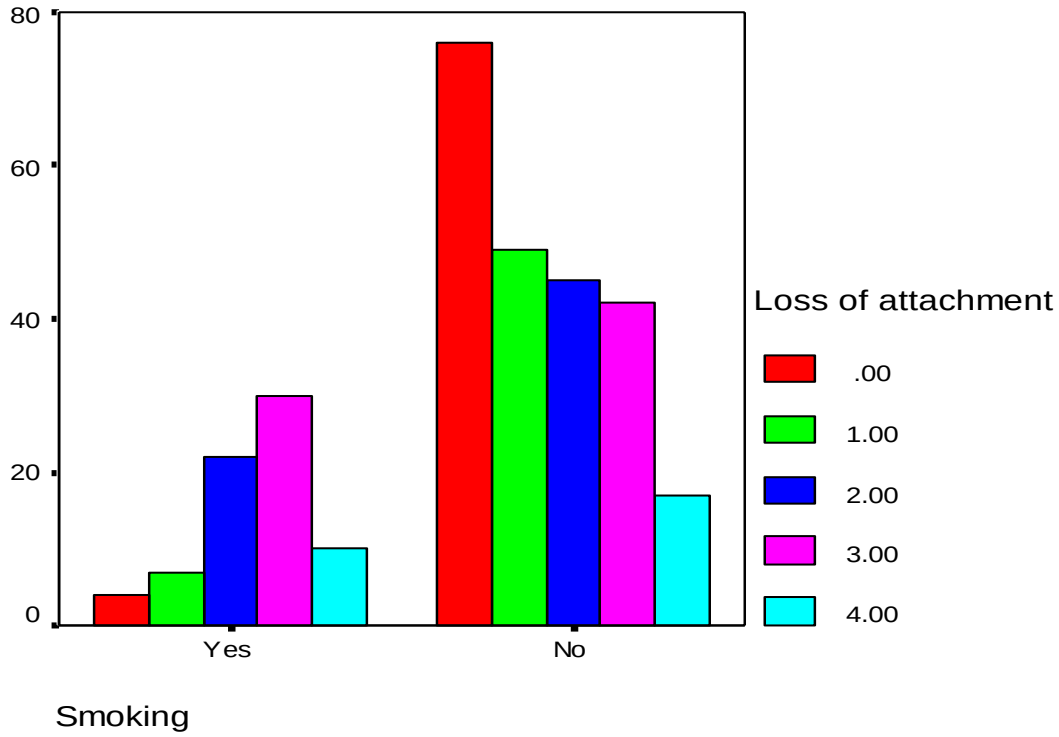
Graph 23

ShowingCross Tabulation of Frequency of Smoking and CPI



Graph 24

ShowingCross Tabulation of Frequency of Smoking and Loss of Attachment



The aim of the present study was to determine prevalence of periodontal disease, oral hygiene status, the relationship of the prevalence of periodontal disease with the oral hygiene, oral hygiene methods practiced, habits and nature of the diet among the adult tribal population in Nilgiris. These data may be useful for determining and delivering oral health care to these tribal people of Nilgiris. In this study, we also investigated the association between age, sex, food habits, oral hygiene status, oral hygiene methods, smoking, smokeless tobacco and alcohol with Loss of Attachment, CPI and Plaque Index.

In the present study, the mean age of the population was 39.3. The females were 58.4% and males were 41.6%. More percentage of male population (33.3%) had severe Loss of Attachment (9-11mm) than female population (16.9%). So in this study, male population suffered a more severe form of periodontitis than females. These results are comparable with that observed in general population also[33]. No other studies were done to associate sex with the periodontal disease in tribal population.

In the age group of 35-44years, 73.6% of the total population had periodontal disease. 23.8% of the population had Loss of Attachment of 9-11mm, which is considered as severe periodontal disease. But in other studies of indian tribal population with the age group of 35-44, reported 100% prevalence of periodontal disease[21]. In other studies conducted in tribal population, prevalence of periodontal disease was 80.3% and 84.8% in surveys of same age group in males of Udaipur region, Rajasthan, India[6]. The reason for decreased prevalence of periodontal disease compared to other studies may be due to their exposure to modern oral hygiene measures like tooth brush and tooth paste, and health care provided by ASHWINI and Government of Tamil Nadu.

In our study, 90% of the male population and 61% of the female population suffered with periodontal disease. The reason for increased prevalence of periodontal disease in males may be due to habits like smoking, alcohol and paan chewing and neglected oral hygiene. In our study majority of the smokers were males[2].

This study revealed, whenever Plaque Index was poor, CPI score and Loss of Attachment was more. This means that severity of periodontal disease is associated with poor oral hygiene. This is in accordance with the previous studies in tribal population[2, 41].

Each tribal population in other studies has used their own traditional oral hygiene measures. In one study, they have used rattan jot (Jatropha curcas and Jatropha gossipifolia) and twigs of Jhatbor (Ziziphus nummularia) as tooth brushes[9]. In our study people have used brush and finger along with tooth paste, tooth powder or charcoal. Prevalence and severity of periodontal disease was more in population who used finger and charcoal as oral hygiene measure

Majority of the population in this study used mixed diet with more frequency of non-vegetarian food. There was no significant difference in prevalence and severity of periodontal disease among vegetarians and non-vegetarians. This is in contrast with other studies where there was lower prevalence of periodontal disease in aborigines of Taiwan. This was related to intake of large amount of vegetables which resulted in good natural cleansing[23].

Smokers, paan chewers, smokeless tobacco users, alcohol users in this study had poor oral hygiene status, more prevalence and severity of periodontal disease than non-smokers, non-paan chewers, non-smokeless tobacco users and non-alcohol users. This is in accordance with the earlier study[21]. Among the total population, 24% and 39.9% were smokers and alcohol users respectively. The reason for this lower percentage may be because the majority of smokers and alcohol users were males and who comprised of 41.6% of the total population. The percentage of paan chewers and smokeless tobacco users were 68.6% and 60.4% respectively. This percentage is more because irrespective of gender differences, people followed these habits.

Regression analysis was performed with Loss of Attachment, CPI and Plaque Index with dependent variables age, smoking and alcohol. In our study age, smoking and alcohol was significantly associated with Plaque Index and Loss of Attachment. This result is in accordance with the previous study[21]. But the CPI score was not significantly associated with age, smoking and alcohol.

We had assessed the prevalence of periodontal disease, oral hygiene status, the relationship of the prevalence of periodontal disease with the oral hygiene, oral hygiene methods practiced, habits and nature of the diet among the adult (35-44 yrs) tribal population in Nilgiris which comprised of Paniyas, Mullakurumbas, Bettakurumbas, Kattunayakans and Irulas.

After a pilot study, which included fifty people from different tribal groups, the main study was conducted. The total numbers of people examined were 303 (Males-126; Females- 177). We used Community Periodontal Index and Loss of Attachment (Ainamo, 1997) to assess the periodontal status. Oral hygiene status was assessed by using Plaque Index (Silness J and Loe H, 1964). Personal interview was conducted to assess the awareness about the oral hygiene, nature of the diet and the prevalence of deleterious habits like smoking, paan chewing and use of alcohol among the population. All the data collected were recorded in WHO oral health assessment form and subjected to statistical analysis.

Mean age of the population was 39.3%. In this, the percentage of females and males were 58.4 and 41.6 respectively. 75.2% of the population exhibited abundant presence of calculus. 26.3% of the population had an attachment loss of 0-3mm, which means healthy periodontium whereas others showed more severe form of attachment loss.

When males and females were compared, more number of females had healthy periodontium than the males whereas more number of males had deeper periodontal pockets and severe Loss of Attachment than the females.

Regardless of the Plaque Index scores, majority of the population exhibited abundant presence of calculus. But when the Plaque Index is higher, majority of the people showed severe form of attachment loss.

Majority of the people showed abundant presence of calculus, severe form of attachment loss and fair to poor Plaque Index score, when they used finger and charcoal as oral hygiene measures. But in case of deeper pockets, there was no significant difference between use of brush and finger.

When the habits like smoking, paan chewing and alcohol were compared with the disease, the people who have these habits showed greater Plaque Index score, higher CPI score and severe Loss of Attachment.

In our study male population suffered more severe form of periodontitis than females. The reason for this may be majority of the smokers and alcohol users were males.

Overall prevalence of periodontal disease in the tribal population of Nilgiris was 73.6% which is comparatively less than the results of the other studies. The reason for this may be due to their exposure to modern oral hygiene measures like tooth brush and toothpaste and health care provided by ASHWINI and Government of Tamil Nadu.

Suggestions

1. There is need to improve the awareness about the oral health, which is an important aspect of overall health.
2. Education and motivation of the population is required to improve the oral hygiene, oral hygiene measures and to refrain from habits like smoking, paan chewing, smokeless tobacco use and alcohol abuse.
3. The role of ASHWINI and Government of Tamil Nadu is crucial to achieve these goals.

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